The Builder.

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GUILDFORD (which speaks in its name of a trading company or guild, and a passage across a river) is thought by some to be the site of the much-disputed station, *Noviomagus;* so the Noviomagians, of whom our readers have before now incidentally heard, made it their meeting-place on the occasion of their last annual excursion into the country, to taste fresh air and hunt up antiquities. They themselves hold to Keston, in Kent, as the site of their Noviomagus; but, nevertheless, they went to Guildford,—ancient Guildford, mentioned even in the will of Alfred the Great,—to see its castle, its church of St. Mary, its crypts, quaint streets, and a neighbouring place or two.

Of the club and their doings we are not about to speak—a club half serious half social,—but it may be worth while to point out a pleasant trip, in pursuance of our plan; and it will be odd if we do not find on the road a suggestion or a fact calling for mention. The club in question,—

> "Love to see the dolphins play,
> Yet still they mind their compass and their way."

If we do not give the words of the quotation exactly they convey our meaning, and that will suffice.

Stopping at the Woking station, it is a short ride to *Sutton-place;* and if it be such a bright, clear, glowing day as this was, you will find plenty of variety, and feel how wholly colour depends on light. A field of buttercups; the tender greens of thickly-massed foliage, with the dark boughs of later trees just speckled with bursting leaves; here, a brown bank, and there some red tiles, make up a picture brighter under such a sun than any palette can touch. It is easy to reproduce forms, but overwhelmingly difficult to paint light and air. It was a real summer's day, of which we speak: the cows had gathered under the trees, and, though not hot enough to make you desire, with Sydney Smith, "to take off your flesh and sit in your bones," would have amply justified the less extreme course of taking off your coat.

Sutton-place, mainly built about the year 1530, by the Westons, to whom Henry VIII. gave it, is a terra-cotta house, and therefore very noticeable: the mullions and transoms of the windows, the parapets, the ornamental panels, the cornices, and the turrets, are wholly of burnt clay, some red, some cream colour, strongly contrasted. The human figure, where it appears in some of the panels, is badly modelled, almost grotesque, but some of the ornaments—those, for example, running up the hollows of the mullions—are very elegant. R. W. and a tun or barrel, for Richard Weston, will be found in various positions. The bricks forming this house were brought from the Low Countries, it appears. The moulds are few, and the inquiry arises why we do not now do more with clay than is done. Many houses were erected in England about the time of Henry VIII. which display coats of arms, capitals, cornices, and parapets, of burnt earth, and where allowed to remain, these have endured well. Fronts of great durability and elegance might be produced readily in this material. As to colour, white, buff, yellow, blue, and red can be obtained; and if a glazing were applied, they could be washed clean without difficulty. Some idea of what could be done with moulded bricks may be gained from the Entrance to the station for the Woking Cemetery, in the Westminster-road,—a very good piece of brickwork, though wanting in free art. The improvement effected in tiles, thanks to Mr. Minton especially, is very great, and will, doubtless, lead gradually to an extended use of them. This species of decoration was anciently held in high esteem, and regarded as a mark of wealth in the possessors, whence, says Mr. Marryat, in his volume on Pottery, arose the old Spanish proverb, "He will never have a house adorned with glazed tiles" (*nunca hará casa con azulejos*), that is, he will never thrive, or be a rich man.

There is a large hall at Sutton-place, perhaps 50 feet long, with remnants of stained glass—some curious; and the dining-room is hung with the stamped leather, coloured and gilt, which was used extensively in the sixteenth and seventeenth centuries. These hangings were known as *tapisseries de cuir-doré.* Some were formed in moulds, the leather having been first softened by boiling; others were produced by hand-labour and at considerable cost. Leather in another shape was used for hangings much earlier than the date just now mentioned. On the walls of the staircases a number of mostly very bad pictures are stacked up; and in one of the upper rooms will be found some designs, signed "Joseph Bonomi, architect, 1789," for the restoration and completion of the building.

The kitchen garden is enclosed symmetrically with a high wall, and has in one of the angles a piquant little octagon building for a tool-house, formed like the main building, of burnt clay. Even the old walls which surround a garden of this sort are full of suggestive objects for observation. "It is sometimes a good and consoling reflection," says Alphonse Karr, "to be in a well-secured enclosure, alone with perfumes, flowers, trees, the heavens, the air, the sun, stars, remembrances, and reveries, and to know that nobody can come and disturb you. I like walls, but I do not like white walls; I like nothing but old walls. I have one here, along which the course of my journey brings me, and which pleases me exceedingly. It is just as old as it ought to be: if it were a little older it would be given up to the mercies of the bricklayers, who would introduce all sorts of new bricks or white stones. As it is, it is grey and black, and is covered with twenty species of mosses and lichens. In the crevices of its top extends an absolute crown of yellow wallflowers and ferns. At its foot vegetate pellitory and nettles, in all their beautiful green."*

On the road to Guildford, which is four miles off, Stoke Church may be viewed. It has been restored, and offers no special points for notice.

The keep of the castle at *Guildford* is an interesting ruin, apparently of the Norman period. "There is not," says Brayley, "the least degree of credible authority for the inferential deductions made by the late Mr. Edward King; namely, 'that this was one of the identical palaces and castles of the earliest Saxon kings;' "that Alfred the Great sometimes dwelt here; and afterwards, occasionally, his nephew, Æthelwald."† Domesday Book, although explicit as to the houses at Guildford, says nothing of a castle there, so that we may conclude it had not been erected at the time of the survey. There seems to be no mention of it in records earlier than 1216, but it was probably built at the end of the eleventh century, or beginning of the twelfth.

At the recent meeting of the Surrey Archæological Society, referred to in our last,‡ a resident member, Mr. Austen, adopted Mr. King's theory, mainly on the ground that the masonry displays what is known as herring-bone work. This, however, is as often found in Norman work as any other, and is not to be relied on as evidence of date. The entrance to the principal story of the castle from the outside, must have been approached by a lofty flight of steps, now destroyed or removed. It is at this time about 12 feet from the ground. In the thickness of the walls at the south-west angle, and running both west and south, is a curious apartment, which displays a Norman arcade, against the wall on one side, with short columns, the capitals of which are variously sculptured. There are some rude but not feelingless carvings, too, on the ashlar, ancient, if not contemporary.

St. Mary's church deserves particular notice for its plan. It consists of a nave and chancel, with a wide aisle on each side, and all the three divisions originally terminated at the east end, in a semicircular apse or *concha*, after the Byzantine mode. In Germany, Italy, and in France, buildings with several apses are not uncommon; but in England they are very rare. The central, and principal apse at St. Mary's was taken down some years ago to widen the street, and the chancel now has a square end; but the apses north and south remain, and offer much to interest. They appear to be of the twelfth century, if not earlier in part. Rickman seems to have missed the peculiarity of the plan, and describes the church simply as having "a tower at the west end of the chancel, and on the north side, a sort of north aisle, with a circular east end, and a western portion with a lower roof." The apse on the north side is separated from the rest of the aisle, and is known as the chapel of St. John the Baptist: it is vaulted with a semi-dome, the groins resting on corbels; and this vault displays a series of very curious drawings in circular and oval compartments, in reddish-brown outline, which have been described and figured in more than one publication. The running pattern on the soffit of the main arch, is Byzantine in character, and particularly elegant. Should the observer, when leaving the church, notice the enclosure prominently lettered in old English, "Church Maidens' Pew," he need not speculate on the office and probable position of these maidens, for there are none; they simply stand, through the error of the scribe, for "Wardens."

In St. Nicholas' Church there is a chapel containing memorials of the Mores of Loseley-place, situated just out of Guildford, and made famous by the curious MSS. which were there preserved.

We will not stop to say anything of the crypt at the Angel Inn, interesting as it is; or the seventeenth-century Townhall, with its projecting clock and curious chimney-piece; or Abbot's Hospital and its stained glass; but will hasten at once to this Loseley Manor House, its hall, Elizabethan ceilings, and delicious gardens, resting, nevertheless, a few minutes to see an appendage to the church of St. Nicholas, the ruins of St. Katherine's Chapel, on the hill. This chapel was rebuilt in 1317, by Richard de Wauncey, ancestor of one not unknown to some antiquaries of the present day. This De Wauncey obtained a charter for an annual fair here, which is still held. Turner once painted it.

The hill on which the chapel stands rises abruptly from the river Wey,—the river which Pope calls

> "—— Chalky Wey, that rolls a milky wave,"

and it commands some pleasant views.

Well, at last we are at *Loseley.* There was a

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* "A Tour round my Garden." Routledge.

† History of Surrey, p. 319.

‡ The short notice of the meeting of the Surrey Archæological Society, which appeared in our last number, has given great umbrage to the honorary secretary, Mr. Webb, and has led him to address to us several, what we are forced to term, very impertinent letters. If the notice in question had been worded from the secretary's own vocabulary, comprising "absurd," "silly," "offensive," "misrepresentation," "bad feeling," and "want of good taste," it would have taken a very different shape, and might have afforded an excuse for his language. But for a childish threat to evoke "the assistance of numerous friends in the London and county press," with which he concludes, we should, nevertheless, have made no further allusion to the matter. We have no "hostility" towards the society,—very far from it, as our pages have shown, but we have, nevertheless, a duty to perform, and will perform it. The fact is, archæology, so called, is being overdone, and if care be not taken, the title of archæologist will come to be one of derision, if not of contempt.

moated house here once, and the moat remains to some extent, though the house has changed its character. William More, who was knighted in 1576, by Dudley, Earl of Leicester, began to build it in 1562, and the structure is what might be looked for as the work of that time,—Gothic in the general arrangement and character, but with Italian forms creeping in. There is a large hall with an oriel: some of the ceilings are good specimens of Elizabethan work, and in the drawing-room there is an elaborately carved Italianized chimney-piece, formed out of a hard kind of chalk, and which is very little injured. In the cornice here, and elsewhere about the house, is the punning motto of the Mores,—"*Morus tarde Moriens—Morum cito Moriturum*," intersected by a mulberry-tree,—a poor conceit, and not very clear.* The use of mottoes about the buildings of this period, is a pleasant and useful characteristic, giving the mind food for thought:—

> "Lull'd in the countless chambers of the brain,
> Our thoughts are link'd by many a hidden chain.
> Awake but one, and lo! what myriads rise!
> Each stamps its image as the other flies!"—*Rogers.*

Some of the pictures at Loseley are interesting, particularly a triptych of the end of the fifteenth or beginning of the sixteenth century, the Presentation of Christ in the Temple. This is a very fine work; parts of it, on the right-hand leaf, indeed, are exquisitely beautiful.

Queen Elizabeth visited this house more than once, and there are some curious letters amongst the Loseley MSS. from Sir Christopher Hatton, advertising Sir William More of the Queen's coming, so that he might keep his house "Sweete and cleane, to receave her Hygnes whensoever she shalbe pleased to see it."

The grounds are very charming. Coming out of the hall there is on the right hand a wall of trees of wonderful height. "God Almighty," wrote Bacon, "first planted a garden; and, indeed, it is the purest of human pleasures; it is the greatest refreshment to the spirits of man; without which buildings and palaces are but gross handy-works." So thought those who built this and other houses of the period, and so think we.

* It is considered as implying, "that the family stock, like the mulberry-tree, should be of long endurance, but that its individual descendants, like the fruit, should, by the common lot of mortality, be subject to speedy decay."—*Kemps, as quoted by Brayley.*

PRACTICAL OBSERVATIONS ON PILE DRIVING.

PILED foundations are most advantageously employed when the solid ground, over which it is proposed to erect any important edifice, is situated at so great a depth from the surface that the removal of the softer and sometimes unequally compressible intermediate strata would be attended with excessive delay, difficulty, or expense; or when there is any probability that either the intermediate materials, or the substratum on which they rest, may be displaced by land springs forcing their way under the foundations.

Piles are usually formed of round or squared timber, and are driven into the ground in a vertical direction, or in one corresponding with, and parallel to, the resultant of the forces they are intended to resist. Of late years, however, both cast and wrought iron have been used instead of wood, in some situations with remarkable success. But in salt or brackish water a chemical action upon the metals takes place, which renders their application very questionable, even if it should not be considered to justify their total exclusion in positions of this description, in which engineers are compelled to use wood, notwithstanding the danger to which it is exposed from the attacks of the boring worms.

The kinds of timber most frequently used in England for piles, are beech, elm, Scotch or English larch, Baltic fir, the American rock elm, live oak, the green heart, or the sabacu, from Guiana. The two last named are said to resist the attacks of the borers, but we have hardly sufficient practical experience in this respect to justify implicit belief in their superior value. It is, therefore, very desirable that authentic observations should be made upon their durability in waters where the above-named destructive worms occasion the greatest injury. On the continent, beech timber is principally used for piling, and a prejudice appears to exist against the family of the firs: round timber is also preferred for detached piles to timber which has been tool-dressed: indeed, Perronet says expressly, that "such piles ought not to be squared;" but, he adds, "they must be straight in the grain, and without projecting knots." In England, the choice of the particular description of wood appears to be regulated by the nature of the ground into which the piles are to be driven; or by considerations connected with the local markets. Amongst workmen, piles of American wood are generally known by the name of "*hard wood piles;*" and those of European are called "*soft wood piles.*"

The preference of any particular description of wood for pile driving, it appears to me, should depend more upon its durability, and immunity from attack by either organic or inorganic causes, than upon its original cost. Beech timber decays very rapidly when exposed to alternations of dryness and humidity: elm resists such exposure more satisfactorily: fir, when free from sap, lasts longer still under such circumstances; but, of course, all woods decay with greater or less rapidity in positions where they are exposed to these alternations; and the only methods which appear to have successfully solved the problem of increasing their durability are those of Kyanizing, or of creosoting. It has been stated that the injection of the ingredients employed in the application of both these methods renders the wood sufficiently distasteful to the boring worms to insure immunity from their attacks.

According to their position in a foundation, piles are distinguished by the following names:—1. *Gauge piles,* driven to define the limits of the ground to be enclosed, or to act as guides in driving the other piles. 2. *Close piles,* driven between the gauge piles, to form a continuous enclosure of wood-work. 3. When the close piles, instead of being of the same scantling as the gauge piles are only of half timber, they are generally known by the name of *sheet piles.* The several descriptions are connected together by *wales* or horizontal ties; by cross braces; and in some cases by a platform, which is either entirely close, or formed as an open grating. The entry of the piles into the ground is facilitated by their being cut to a sharp pyramidal end, generally shod with iron, either cast or wrought: in sheet piling, however, the various pieces of wood have often a sharp edge, parallel to the face of the enclosure. Wrought-iron hoops are generally used to prevent the heads from splitting in driving, or from becoming too much compressed. In some cases, piles are driven with the broadest end downwards, as for example, in foundations executed upon extraordinary depths of compressible mud; and Perronet appears to consider that there is some advantage in adopting this system when the middle of the height of the piles is situated at nearly the mean level of the water, a condition which sometimes occurs in the erection of large timber bridges. From some experiments made at L'Orient, recorded in Sganzin's Cours de Construction, it appears that piles so driven offer a resistance equal to about 45½ lbs. per foot superficial of their frictional surface, which is barely a fifth of the resistance they would offer if driven to a solid stratum. It is important to drive the piles, if this mode of placing them with the broad end downwards be adopted, by beginning with the outer rows, and working inwards towards the centre of the mass.

When piles are used in solid ground, and are designed to resist a vertical pressure, they are driven by means of engines until what is called a *refusal* is attained; that is to say, until they only descend a certain depth under an impulse, which is made to vary with the nature of the superstructure, the number of the piles employed, or the machinery used for driving: but when the piles are intended to resist a transverse strain, or any tendency of the foundations to lateral displacement, they must be driven until they attain a solid substratum, without reference to the resistance they may meet with in their descent. It is considered by some engineers, that the ground around the piles becomes so compressed in the former case that an adequate resistance in the foundations is secured, even when the piles are not driven to the more solid strata. In the latter case, the piles become fixed in the materials through which they are driven, and can only move by being displaced horizontally, or by being broken off on the line of thrust.

Although the earth in which piles are driven contributes to their power of resistance to an insistant load, it is not customary to take it into account; and the number, as well as the distance apart, of the piles is calculated as though they had to support the load without any assistance. In other words, the weight which is brought upon each pile is calculated upon the supposition that it should be able to support such a weight in the air, without crushing. Under these circumstances, it is evidently necessary to diminish the weight upon any definite portion of the support in proportion as the height of the support itself is increased. Rondelet gives some tables of the weights which may be brought with safety upon the various descriptions of wood used for piles, according to their length; but it may suffice at present to observe, that when the length of the pile, supposed to be of oak, does not exceed sixteen times its diameter, it may be loaded permanently with a weight of from 430 to 500 lbs. per inch superficial of the sectional area, and the extreme refusal must be such as to ensure stability under such a load. There are few cases when the load above named may not be slightly exceeded; at any rate, it must be considered to be fairly within the limits of stability, although far in excess of the load usually applied.

The rules generally adopted for fixing the "refusal," appear to be empirical, and to require more elaborate investigation than they have hitherto received. It is customary on the continent to fix it upon the following principles. If each pile be intended to bear a weight of twenty-five tons, it is not considered to have attained its proper refusal until it will not descend more than two-fifths of an inch with a series of thirty blows from a ringing engine, with a monkey of 12 cwt. falling 4 feet; or with a series of ten blows from a common pile engine, with a monkey of the same weight falling 12 feet. If the weight to be brought upon each pile should be 12½ tons, the refusal is altered to four-fifths of an inch; and if it be only 5 tons, it is altered to 2 inches. But it must be evident, that the vibrations excited in the piles themselves, or in the ground, must differ so essentially under the conditions of the ringing engine with the small fall, from those which hold with the piling engine with the great fall; and the effects of the action and reaction developed under these respective circumstances must be so dissimilar, that no simple geometrical ratio can exist between the efforts exerted in the respective cases. At the bridge of Neuilly, where each pile supports a total weight of 52 tons, Perronet adopted the refusal of one-fifth of an inch for each series of twenty-five blows, with a fall of about 4 feet 8 inches.

The engines generally employed for the purpose of pile-driving are the ringing engine, the pile-driver, and Nasmyth's hammer. The first consists of a frame in which a monkey, or rammer, is raised vertically above the pile by means of a cord passing over a large wheel, and worked by a number of men standing around. As all intermediate machinery is avoided, the blows struck by this engine follow one another with tolerable rapidity, and may easily be carried to twenty or thirty per minute; but the weight raised is necessarily limited by the unfavourable mode in which the power is applied, and the fall is equally confined within a small range. In the ordinary pile engine, the monkey is raised to any desired height by means of a crab; so that the weight of the monkey and the height of the fall may be made to vary within very considerable limits; but the number of blows given within a definite period becomes diminished in the same proportion that the power of the engine increases. Of late years, the Americans, and many of our contractors after their example,

have applied steam power for working machinery of this description with considerable success. Nasmyth's hammer is, however, the most decidedly marked modification of pile-driving machines lately introduced, and when applied under the proper conditions, it appears likely to render great service. Dr. Potts' system, and the modifications it has lately received, appear to be more adapted to secure the descent of what may perhaps be correctly described as small caissons than of piles, as the word is usually understood. Attention is therefore called more exclusively to Nasmyth's hammer, as presenting the greatest advantages in certain situations.

It consists of a cylinder, in which a piston bearing a rod connected directly with the monkey, or striking mass, is made to move in one vertical direction by means of high-pressure steam, which escapes directly the piston reaches the head of the stroke, and allows the monkey to fall by the mere effect of gravity. The weight of the monkey need only be limited by the capacity of the cylinder or the elasticity of the steam; and accordingly in practice it varies from 32 to 45 cwt. The height of the fall is, however, limited by the stroke of the piston, and rarely exceeds 2 feet 6 inches. At the same time it is to be observed, that the number of blows is greatly increased beyond that which can be given by any hand gear; and instead of being from thirty-five to forty per hour, as in the case of the ordinary pile engine, it becomes from fifty to sixty per minute. The effect of each separate blow under these circumstances is naturally less with the Nasmyth's hammer than with the old engine; but the rapidity with which the blows succeed one another must considerably modify the descent of the piles, particularly in ground able to transmit undulations separated by long intervals. The whole question of the influence of the elasticity of the ground upon the rate and manner of descent is, however, still involved in too great uncertainty to admit of any definite conclusions on the subject; and, indeed, it is found to complicate not only the theoretical reasoning upon, but also the practical operations connected with pile driving to a very serious extent.

For instance, it has been frequently observed that after a pile has received a certain number of blows from an ordinary pile-engine, it will "refuse," or cease to drive. But if it be then allowed to rest, and after a definite period the driving be recommenced, the pile will descend rapidly under blows of far less power than those which were previously unable to move it. This phenomenon has been attributed by some authors to the increase of the reaction of the ground developed by an exaggerated "vis viva;" by others, to the fact that the pile itself, and the ground round it, assume a state of vibration, which, for the time, disperses the effort exercised on the head of the pile. Nearly all the investigations which have been made with respect to the transmission of movement in elastic media have been made upon the perfectly elastic gases; and they hardly bear upon the conditions likely to prevail in the denser, less homogeneous, and comparatively speaking nonelastic, materials into which piles are usually driven. But it appears at least more probable that the vibratory undulations produced by heavy blows succeeding one another at distinctly perceptible intervals, should, on their reflux, coincide and interfere with the transmission of a succeeding blow, than that the lighter blows following one another almost instantaneously should give rise to undulations of a character to check the descent of the pile. Indeed, in the latter case it is possible that the undulations, especially if they be reflected, would so far interfere with one another as to procure a comparative stillness of the ground.

The "refusal" to be adopted when Nasmyth's hammer is employed, may easily be calculated from those before given for ringing or for pile engines—assuming that the forces bear to one another a simple geometrical ratio. If a hammer of 34 cwt. be used with a fall of 2 feet 6 inches, a succession of seventeen blows would produce an effect presumed to be equal to that of thirty blows from a ringing engine of 12 cwt. with a 4-feet fall; or ten blows from a pile engine of 12 cwt. and a fall of 12 feet.

Theoretical observations were confirmed by some circumstances noticed by myself during the execution of the works for the repairs of the Blackwall entrance of the West-India Docks, in which I also had an opportunity of learning practically the conditions most unfavourable to the use of the steam pile hammer. In this instance the side wall of the river entrance to the Blackwall Basin was carried into the channel by a lateral movement of the ground, apparently produced by some copious land spring, or by the escape of the water retained in some of the inner basins at low tides. The old wall was carried bodily forward for a length of about 120 feet, in a kind of irregular curve, whose maximum versed sine was about 10 feet: it sank about 9 feet below its original level, and forced up the bed of the navigable channel nearly 3 feet. Mr. Rendel, who was consulted by the directors of the company, decided upon replacing the old wall by a timber staging. This was intended to be close planked at the back, on the land side, in order to retain the earthwork of the pier heads; to have a paved stone floor in the intermediate portion, between the close planking above mentioned, and a corresponding parallel row of close piles driven towards the water-way. It was proposed, also, that the whole of the piles to be driven on the inside of the old wall should be placed before the old works were removed—excepting, of course, in the positions where they interfered with the piles. The masonry and the earthwork, both in the channel and in the situation of the new stone floor, beneath the staging for the pier head, were to be removed after the completion of the latter.

The effect of retaining the ruins, in combination with the compression of the subsoil which had already been produced by the weight it had supported for so many years, was to create a degree of resistance to the entrance of the piles totally unprecedented. The ground itself consists in parts of a bed of rounded flints, agglutinated by fine white sand, occasionally containing veins of the hydrous oxide of iron. Apparently it is of the same nature as the Gun Fleet shoal in the bed of the Thames; and geologically it is analogous to the member of the basement beds of the London clay which occurs upon the surface near Bromley, in Kent. When this bed is not confined laterally, it does not offer any very extraordinary difficulties to the descent of piles, or to the operations of boring—although evidently, in consequence of its composition, it must exercise great friction, both upon the boring tools and the piles driven through it; and the resistance so occasioned would naturally be seriously felt when it became necessary to insert close, or sheet piling. But, in this particular case, it appears that the old wall acted to prevent the gravel from spreading; and consequently the new materials, the piles, could only be introduced by displacing and compressing the materials into which they were forced. It followed that the labour, difficulty, and cost of the formation of the stage were increased to such an extent as to entail a very heavy pecuniary sacrifice; and, indeed, in the case of some trial borings, to induce the contractor entirely to renounce the attempt to traverse the bed of gravel.

Under normal circumstances, the cost of driving piles, properly shod and hooped, by Nasmyth's hammer, would have been about 2s. per foot forward in ground of this description, and upon an average of gauge and sheeting piles, the rate of progress would be about 5 feet per hour. The cost of driving by hand-gear would have been about the same; because the magnitude of the work in question was not such as to render the cost of the temporary staging required for the hammer an unimportant element in the relative value of the work effected by it. But, in consequence of the induration of the ground, from the causes before mentioned, the rate of descent was so materially altered that in the space of $1\frac{3}{4}$ hour no less than 5,880 blows were struck upon a pile-head in the presence of the author, without advancing it more than 3 inches. Naturally, under such circumstances, the pile-heads were rapidly "knocked up;" and frequently, when fir timber was used, as many as six or seven heads were required, thus entailing a loss of from 4 to 5 feet lineal of the baulk. When rock elm was used, this source of expense was diminished; for it was found that the heads would in this case last three times as long as those of fir piles. But the nature of the timber did not otherwise affect the rate of descent, which varied from 1 foot to 3 inches per hour, and frequently cost as much as 42s. per foot lineal, merely for the labour and working of the engine—leaving entirely out of account the expense of re-heading the piles, or any charges for superintendence, rent, rates, or taxes.

Excessive as this cost of the work was in itself, it was, however, still further increased by many of the piles being broken during their descent, in consequence of the shoes working off, and also of the development of longitudinal fissures. In some cases, where these fissures ran at a slight angle across the pile, the latter became so shattered, and the fissures opened to such an extent, as to render it necessary to cut off, or even to draw the piles, after considerable progress had been made in driving them. Both these sources of expense were of irregular occurrence, and it was almost impossible to guard against them; for neither the inequality in the resistance of the ground could be foreseen, nor do the longitudinal fissures always show on the sides or the ends of timber baulks in their original state before driving. The piles drawn on account of the loss of shoes were two: those which were drawn or cut off, on account of defects in the timber, were about ten in number; and it may be added, that towards the end of the work it became necessary to use rock elm constantly instead of Baltic fir, from the increased resistance to the descent.

At the Great Grimsby Docks these difficulties did not occur. The works were, in this case, executed upon the alluvial mud at the mouth of the Humber, which lies (with a variable thickness) upon a stratum of hard clay. In consequence of the inequality of thickness in the upper stratum the piles varied considerably in length, being occasionally 70 or 50 feet long, whilst the average length was 30 feet, of which the last four were in the harder clay. Sometimes the piles would traverse the first 26 feet in an hour, and the remaining 4 feet in half an hour: at others, and especially when many piles had already been driven near the position of the one observed, the resistance was greater. But there were few instances in which a less number than from thirty to fifty piles were driven per day by a single engine. To perform a similar amount of work with the ordinary pile-engines would have required at least from ten to twelve machines, with their respective gangs of workmen; so that it would appear that, under favourable conditions, the economical results of Nasmyth's hammer are such as to ensure its adoption. The cost of working the engine employed at the West India Docks, and at Great Grimsby, was about 10s. 6d. per hour, including wages of driver, stoker, carpenter to attend to the pile, labourers, and incidental expenses; whilst the cost of each of the ordinary piling-engines would not be less than 1*l.* 0s. 6d. per day, without any allowance for interest on capital, depreciation, repairs, &c.

The practical conclusions which I am disposed to draw from my experience in the use of the various descriptions of engines for the purpose of driving ordinary piles, may be stated briefly as follows:—

1st. Ringing engines are adapted to driving short piles through ground of a moderate degree of hardness, but the immense number of men they require must exclude their use when the works are extensive, and many piles are to be driven.

2nd. Ordinary pile-engines, or those in which monkeys of about from 12 to 16 cwt. with falls between 12 and 26 feet are used, are the most efficient and economical when the number of piles to be driven is small, or when the ground is remarkably hard.

3rd. When, however, the number of piles is great, and the ground of an ordinary degree of hardness, Nasmyth's hammer is the most economical mode of executing works of this description.

It must, then, it appears to me, be the duty of the contractor to carefully estimate the relative proportion the first outlay will bear to the whole expense of the works, and to ascertain

the precise nature of the ground (both in its original and its contingent states) before he decides upon the machinery he will adopt for pile-driving in any particular case. The engineer or architect probably ought also to take these considerations into account, before he fixes the time for completing the works.

Dr. Potts' system of driving piles by atmospheric pressure, before alluded to, originally consisted in the use of hollow tubes of cast iron, open at bottom, and able to be closed at top; the open lower end of which was placed upon the surface to be traversed. When the tube had descended as far as possible by its own weight, the ground in the interior was extracted, and the tube being placed in communication with an air-pump, a species of vacuum was formed. The atmospheric pressure upon the top then naturally caused the tube to descend, until the compression of the inner air enabled it to counterbalance the weight of the external atmosphere. The earth in the interior was then again removed, and the operation repeated until a sufficiently solid substratum was reached, when the interior of the tube was filled in with concrete. Latterly, the tubes have been executed of such dimensions that they ought more properly to be called caissons; and in the foundations of Rochester Bridge, Mr. Hughes is said to have introduced so many alterations and improvements into the system that it would be highly interesting to compare the successive modifications of the original idea, the real merit of which, perhaps, after all, should be attributed to Coulomb, who in the year 1788 published a memoir, entitled "Recherches sur les Moyens d'exécuter sous l'Eau toutes Sortes de Travaux hydrauliques sans employer aucun Epuisement," which contains the germs of much that is assumed to have been invented at later periods. Be this as it may, the circumstances under which the use of open cylindrical caissons appear to be desirable may be stated to be when the compressible substratum is of small depth, and when it is immediately succeeded by a thick stratum of incompressible material. It is essential that the latter also should be of a nature to resist the dissolvent action of water, in case the smooth sides and cutting edge of the cylinder should lead that element to the substratum. Upon railways, to quote one instance of the situations in which these cylinders might be used, it may be necessary to cross a long, semi-fluid bog—as upon the Munich and Augsburg line. The system actually adopted there was to sink holes through the peat, in alternate squares like a chess-board, about 2 feet wide at the bottom, and 3 feet at the top, the average depth being about 15 feet: these holes were filled in with puddling clay, and the embankment was carried upon them. In this particular instance the peat was sufficiently solid to allow of the holes being cut and left without any support, and to resist the lateral displacement of the clay. Had it, however, been similar to many of the Irish bogs, the use of some such caissons as Dr. Potts introduced would have been indispensable, and, perhaps, it would have been preferable to have sunk them by pneumatic pressure, rather than in any other way. Our Transatlantic brethren content themselves with carrying their railways over such foundations upon common piles, partially driven into the ground, and partly standing above it—a mode of proceeding which may answer in countries where it is essential to keep down the first cost of such enterprises, and where wood is sufficiently cheap to render it unnecessary to regard its waste. But evidently piles thus partially exposed and partially covered up are liable to rot with great rapidity.*

FALL OF A BELL.—At Sherborne, lately, while the ringers were welcoming in the anniversary of the Coronation of the Queen, the third bell of the peal in the old church tower fell down from its bearings. The damage, however, was found to be very slight. The axle had broken asunder, and the bell, which is said to weigh 21 cwt. had fallen, breaking in the floor and one joist, but not injuring the rafters. By the aid of a few carpenters and a little tackle, according to the local *Journal*, the bell was soon raised and the damage repaired.

* From a paper by Mr. G. B. Burnell, read at the Ordinary Meeting of the Institute of Architects, June 18th.

THE SANITARY QUESTION.

ISOLATED but warning instances of the recurrence of the virulent cholera within the bounds of the metropolitan "bills of mortality" urge us, one and all, to be up and doing our part in the reagitation of this great question.

So far as regards the metropolis, the main point for consideration and amendment is the Thames. What is to be done with this *cloaca maxima*,—this tremendous sewer of sewers. Bad as it long has been, we doubt if ever it was so offensive—so beastly—as it has now become. The drought of the present summer has intensified its horrors tenfold. Professor Faraday only expresses, in the best possible way, the ideas of thousands whose senses are receiving the vilest offence as they sail along this filthy sewer, in pointing attention to its horrible condition in the columns of the daily press. Are even large type, the *Times* columns, and Dr. Faraday capable of doing *anything* for its permanent amendment? Why should either the one or the other be requisite at this time of day to urge on so vital an object and end? Does any one now doubt the deadly issue of such stenches and vapours of human refuse as those which pervade the atmosphere of the Thames? Why they are "fit to kill a horse;" and as if to remind us that they are so,—that human filth is too much even for the beasts to stomach,—we happen, just at this moment, to fall upon a little paragraph in the *Armagh Guardian*, to the effect, that two fine military horses have just been poisoned—literally killed—by the noxious vapours emanating from a barrack cesspool. Every site of congregated human beings, whether it be in a barrack or a metropolis, has a natural and inevitable tendency to become a noxious dunghill, if not constantly and thoroughly submitted to cleansing, sweetening influences; and the action and use of such influences is, or ought to be, a perpetual and paramount *duty* on the part of all municipal authorities. How disgraceful to all concerned, then, is the present state of our metropolitan river! If, as the *Times* remarks, we resign ourselves to the idea of its being the great sewer of London, what a filthy set we Londoners are not to have it covered decently over! If, on the contrary, we regard it as a great highway, and a source of metropolitan water supply (as it actually is), how still more filthy we are to sail on such a sewer, and to contaminate the very source of such a vital necessary with all that is noxious and vile! What is it but this, and such as this, that renders the country so much more healthy and wholesome than the town, and the country town than the city and the capital? Why is it but on such accounts, that while the three healthiest districts in England are Glendale ward and Rothbury, in Northumberland, and Eastbourne, in Sussex; and while the average number of deaths yearly in these places is only 15 in every 1,000 of the population; and while even in such little towns as Haltwhistle it is but 16 per 1,000, Bellingham, 17, Morpeth and Hexham 18, and Alnwick 19,—in Berwick it is 24, in Durham 24, Tynemouth 25, Newcastle 27, Sunderland and Gateshead 28, Hull 29, Bolton 32, Liverpool and Manchester 33, and so on, worse and worse, according to the extent of the congregation and compression of human beings within one limited and circumscribed circle? The greater the town the more pressing the necessity of perpetual cleanliness; whereas in our metropolis, the greatest of all, we seem to regard ourselves as liberated from all sanitary laws or restrictions, so far as regards the Thames and *its tributaries, the sewers*. Would that some such plan as that of Dr. Sayer, to which we elsewhere allude, were forthwith set about, and intercepting main sewers at once begun in earnest, without one word more of mere talk about it!

Apropos of the Thames, what *are* the Chelsea Waterworks authorities about that they do not supply something better than the miserable stuff they at present call water to their customers? What precise relation does their unusually muddy material (filtered or not filtered) bear to the likewise unusually opaque "element," or compound rather, in the river, whence they "extract" their supply? We fear to face this question any further, or to follow it to its legitimate issue: all that the Chelsea Waterworks customers can do is to shut their eyes, open their mouths, and swallow in exemplary faith what the Chelsea Waterworks may choose to send them.

THE METROPOLITAN MILE-POSTS.

BY A COUNTRYMAN.

IT is now many years ago, and yet we remember the circumstance as clearly as some of those of yesterday, that we read on the mile-stone (it *was* a stone) near our native town, for the first time, "So many miles to LONDON." A strange, yet impressive idea of the great metropolis was formed in the mind, and often after then we wandered onward with no other seeming object than to enjoy the reflection that we had progressed some miles nearer to that place of palaces, where the streets, as we were told, were all paved with gold.

In more advanced years, when increased strength and a love of old buildings, rivers, trees, and things picturesque or curious had coaxed us in search of them over many miles of road, we seldom passed unnoticed the inscriptions, "So many miles to London." Time went on, and, mounted on the stage-coach, we left our dearly and well-remembered mile-stone, and rolled on, passing mark after mark, until we reached the bustling haven of our hopes.

It is curious to reflect now on the difference between the London in reality and the dream of childhood; but this we still believe, that London streets *are* paved with gold, and that it is a richer mine than California to the greater portion of those who truly, diligently, and with intelligence, labour and search. However, years of the fog and excitement of London life have not damped the love of rambling, not only in that wonder of wonders, the metropolis itself, but also to the places of interest by which it is surrounded. During these peregrinations, many of them of pleasant memory, our old habit of noting the mile-posts, as we had better call them (the stones having to a considerable extent been changed for other materials), has often caused us to wonder at the want of system which is displayed by these wayside records. On some suburban mile-posts is marked "One mile to London." This, however, is a vague direction, for where does London begin? where does it end? or where is its centre? Are we to consider Poplar in the east and Paddington in the west; Kentish Town, Holloway, &c. on the north; Walworth, and the other large populations in the south, as the commencement of London? Does the inscription, "So many miles to London," mean that the City is London? Even this is a wide mark, and we are puzzled to know if we are so many miles from Whitechapel or from Temple Bar, both extremities of *the City*, which though of such huge extent, forms but the heart of the mighty body which spreads around. *London*, even considering the city as that particular point, is a wide address, as it is easy to discover by calling a cabman and asking him to drive to that place.

Other suburban mile-posts are more explicit. On some we have noted, "so many miles to the Angel, at Islington;" on others, "To the White Horse Cellar,"—"Holborn-bars"—"Hyde-park-corner"—"Charing-cross:" some journeys end at the Royal Exchange; some at the Bank; others at the Post-office in St. Martin's-le-Grand: the termination of the Epsom-road is at Whitehall and the Exchange: one of the Tottenham roads ends at Portland-place; and a few posts have on them, "So many miles to where Hicks's Hall formerly stood!" This is, perhaps, the most vague of all; and we have heard some, with wonder in their countenances, ask who was Hicks?—*what* was Hicks?—and where was Hicks's Hall. It may suffice for our present purpose to mention that Hicks's Hall was in St. John's-street, Clerkenwell, and that a memorial of it in the shape of a mantel-piece is preserved in the present Sessions House, Clerkenwell-green. Other mile-posts for the guidance of the ignorant wayfarer might be mentioned, but to increase the examples is unnecessary.

At the present day, when London has become so bulky, and is still constantly growing in a compound manner, like a rolling snow-ball, it is

difficult to imagine the state of confusion we should have been in but for the numbering of the houses and shops. This and some other plans have served to keep us in something like order. The police are alphabetized and numbered: the cabmen and omnibus-men in like manner have their numbers from one to several thousands. Lately it has been considered necessary to arrange the watermen and letter-deliverers in a similar manner. Notwithstanding all this, as is shown by the varied inscriptions on the mile-posts, the *centre of London has not yet been clearly established;* and surely it must be difficult in many ways, in such a mass of buildings and population as are contained in the metropolis, to have a proper system of order without a well-known and decided central point. So far as the transmission of letters is concerned, a circle is drawn from the General Post-office, and to this point the mileage fairly set forth on the *mile-posts throughout the kingdom should radiate.* The new pillar post-offices in the streets, on each of which is the distance in miles and furlongs to the General Post-office, is a move in the right direction, and which only requires to be more extensively carried out.

In Cannon-street, not at a great distance from the General Post-office, as our readers know, still stands the venerable London stone, which by most antiquaries is considered to have been the central point for the purpose of the measurement of the Roman city. This was a capital example of order, which it is to be regretted has been lost sight of; yet it is curious to notice, notwithstanding the random manner in which London has been built at different periods, what a short distance that which must again become the centre of London has moved during 1,600 years. Some will say that it is not worth while now beginning to make any fuss about centralizing our roads, for that as the paint of the old posts wears off they will be sure to do what is so obviously necessary,—mark, "To the Post-office." It would seem, however, that such is not the case, for we note many posts, seemingly newly-lettered ones, in the old fashion: at Brompton, for example, is one, on which is inscribed, "Fulham 2½—London 1." Very precise, certainly!

To carry out the alteration to which we refer as being required would, it is true, so far as the provinces are concerned, be attended with some trouble and expense; and yet it is highly necessary. In the neighbourhood of London the cost would be but trifling, particularly as many of the posts are only painted. In necessary public improvements we should make the cost a secondary consideration.

Supposing, as indeed it must as a matter of course, that the General Post-office in St. Martin's-le-Grand becomes eventually the central point of London and also of the United Kingdom—the Post-office even is too vague a centre: we ought to have a distinct object, that we can see and touch; and, standing beside it, as the Anglo-Romans did in ancient days by the side of London-stone, know to a yard without dispute the distance from town to town, and from place to place. This object, in a great city like London, should be remarkable both for its fitness to its purpose and for its artistic design, and would be a proper place for the reception of the effigies of those men who, like Macadam, Telford, Stephenson, and Rowland Hill, have advanced the nation by facilitating communication.

NORMANDY.*

How completely is the pleasure or profit of any pursuit in which we may embark in life dependent upon the *animus* with which we engage in it, and the capacity with which we fulfil it. The well-known axiom of philosophy, that size can be but relative,—that is, that the same object appears of various degrees of magnitude according to the eyes with which, or the medium through which, we behold it, applies still more forcibly to beauty, whether of art or nature.

"De gustibus non est disputandum."

The universally accepted aphorism renders caution necessary in the expression of opinion upon beauty, for the very standard of excellence by which we form those opinions, though of universal acceptation, varies in intensity according to the different capacities and various powers of appreciation with which we regard them.

These observations apply with peculiar force to the subject of travelling,—an intellectual and delightful mode of passing spare time, once limited to the adventurous few, but now, from facility of transit, and wide-spread accommodation, within reach of the many, but still peculiarly adapted to the fortunate class who possess those three grand requisites for its perfect enjoyment,—health, wealth, and wisdom. The first and last ingredients are the most important, for our appreciation of what we see mainly depends upon them.

The most important condition of travelling is a definite object. The architect, the archæologist, the painter, the sculptor, the musician, the linguist, the botanist, the geologist, the agriculturist, the scholar, will all find abundant amusement where the lounger will expire of *ennui*.

Even the places voted in the handbook "dull, dirty, devoid of interest," will show, upon inspection, that their sentence implies comparison only; and it must be a desolate region indeed that will afford no kind of satisfaction to one or other of the above investigators. Abroad, one certainly finds more excitement than at home: language, dress, features, manners, habits, government, religion, architecture, produce, climate, history, and geographical position, all being different to what we are accustomed to, extra stimulus to exertion is awakened, new gratifications are conferred. Among the continental regions adjacent to England, none have a greater claim upon the sympathies and interest of every educated Englishman than Normandy. Well may the French call it "*la belle*," for it includes some of the most lovely scenery of their wide domains. The superiority of the locality was early evinced by the preference shown by those best of all judges the monks, who covered the face of the country with abbeys, convents, and monasteries, whose remains to this day present an inexhaustible treasure of archæological studies.

The crumbling relic of feudal grandeur that rear their time-honoured towers above this fair scene of field and foliage, bring one back to the period when the Norman William left his paternal dukedom to try his fortune in that wider and finer field, where the blood of his race was to be for ever after blended with our own. That fusion of blood and interest, of language and manners, has formed an indissoluble connection between England and Normandy, and renders it the more remarkable that a country so near, and of attractions so distinguished as the latter, should be so little visited comparatively by our tourists; illustrated, too, as it has been, by such investigators as Turner, Gally Knight, Whewell, Cotman, Pugin, Caumont, and Charpentier.

The specimens of mediæval architecture are unrivalled for richness and variety, but have been too often described by us to render enumeration necessary. In our previous volumes will be found several long notices of Caen, Rouen, and other parts of the country, with views of many of the buildings.

The volume before us bears evidence throughout of the scholar and the keen observer.

The portion of Normandy explored was the department of Calvados,—the time occupied, including journey there and back, one month.

To reach the land of promise, the author landed at Calais, and touched at Boulogne, Dieppe, and Rouen. The tour of Calvados itself comprised Honfleur, Caen, Bayeux, Vire, Falaise, and Lisieux. This department lies between those of Seine Inferieure and Eure, on the north-east side, and of Manche and Orne on the west and south; its greatest length being seventy-five miles, its greatest breadth forty-nine. It contains mines of iron and coal, quarries of great extent, variety, and value, including those of granite and the well-known Caen stone, to the reputation of which latter, by the way, the quarry owners are the worst foes. Its chief trade is in wheat, horses, fatted oxen, and cider; and the making of lace, tulle, and blonde, employs 21,000 women and children in Caen alone.

As to the origin of the title, Calvados, Mr. Musgrave says, "Most of the principal towns and villages of the continent have their Calvaire; an eminence, generally in the outskirts of the place, distinguished by a crucifix and small oratory, or shrine for prayer,—around which are the graves and monuments of the dead; a cemetery, in fact. The Spanish word for Calvaire is *Calvados;* and this appellation, primarily annexed to the *reef* only, at the period of the occupation of this coast by the Spaniards, was subsequently adopted by the government (when France was divided into departments), as the distinctive name of the region of territory whose boundaries have been already described. It was long before I succeeded in acquiring this information. In all quarters, even among the savans of the Lycée Imperial, at Caen, I heard the most ridiculous conjectures as to the derivation of the word."

He gives a very satisfactory account of the provisions for education provided, and is urgent, as every man should be, in calling for the most complete arrangements with this end in view in our own country:—"Education should be 'laid on,' like water, in every town and village street. It should be cared for like ventilation; like pure air. If the dense masses enjoy it not, they sicken, and dwindle, and prematurely decay; and better were it for many legions of loose and lawless children to die in their ignorant and irresponsible infancy, than grow up untaught, uncivilized, unmanageable, and unfit for a future here or hereafter; since, in such instances,

'Worse than dying is to live;'

and, in my humble opinion, the best Boards of Health that England could maintain in efficacy, at the present moment, would be those that should form themselves into a standing committee of management for bringing every poor man's child, in town or country, within the salubrious and blessed influences of a well-ordered school; of an institution where religious training should go hand in hand with practically useful knowledge, and patience have her perfect work in conciliating a *love* of such attainments, *and of the teachers. Their* aim should ever be to educate for *eternity;* but let such trainers of youth take hints from these large French schools, where that ambition of self-maintenance is awakened which is best calculated to provide for each child through *time*."

The writer gives a long account, in a popular style, of the Bayeux tapestry, that historical sampler by the past young ladies of Normandy, and dilates with enthusiasm on the beauty of Falaise, as well he may,—the birthplace of William the Conqueror,—Falaise, with its towering castle, bold rocks, and luxuriant trees. In his notice of St. Peter's church, at Caen, our author appears to confuse, as many others do, the two Pugins. It was the elder Pugin who made tours of Normandy with his pupils, and a well-known work was the result.

We have said enough to show that Mr. Musgrave's work contains much that is pleasant and instructive. Although not architectural in its true sense, it contains much pertinent remark relating to art, and the architectural as well as general tourist will find it a useful and agreeable *compagnon de voyage*.

DESIGNS AT GORE HOUSE.

IT seems desirable to call the attention of potters and encaustic tilemakers to the specimens of elementary design now exhibiting at Gore House, Kensington, being a portion of the studies of the Schools of Art collected there, and thrown open to the free inspection of the public.

The form selected by the Marlborough House authorities was a hexagon, of about 7 inches diameter, and the flower from which the designs were to be made, the *solanum dulcamara*, or woody nightshade, the flower being conventionalized, and arranged geometrically so as to fill the space within the hexagon as evenly as possible.

The efforts which the students have made in this class prove that it is a popular one; indeed, after a careful review of the several classes, and the works in the Exhibition generally, it may with truth be said that this

* A Ramble through Normandy; or, Scenes, Characters, and Incidents in a Sketching Excursion through Calvados. By George M. Musgrave, M.A. London: D. Bogue, Fleet-street. 1855.

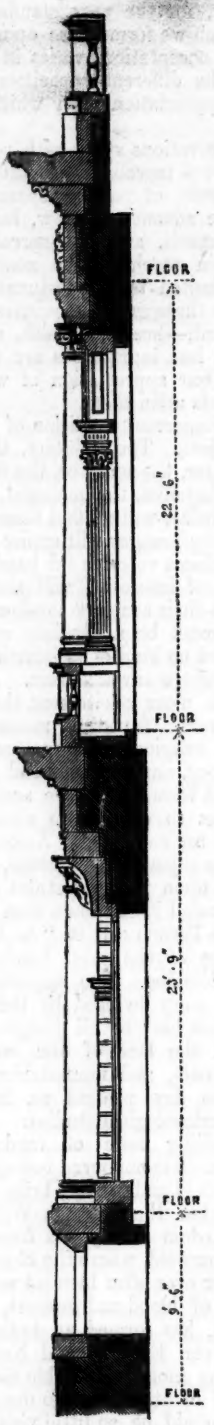
elementary exercise of the inventive faculties has been productive of more satisfactory results than any other portion of the school system.

It is certainly within the mark to say, that there are a hundred and fifty designs, all composed of the woody nightshade, and all filling the required space, no two of which in any degree resemble each other. Produced by many students of different education and manners, the impress of each mind is distinctly stamped upon its work, resulting in a variety which is positively marvellous. Few colours and many colours are made use of, according to the taste of the individual student, and each differs from the other in both drawing and colouring.

Now, as a hexagon is a form frequently used as a tile for ecclesiastical purposes, and as there is a much greater want of good designs in those of the present day, than technical excellence of manufacture, here is an admirable opportunity for our potters, of obtaining such designs as would be worth the expense of reproducing in encaustic and earthenware. Extremely simple in their arrangement, they would combine individual excellence with extremely rich general effect, if used as the pavement for altar-steps and chancels. I am aware that in many cases the colours would have to be altered, and their number modified; but let me point out the designs of the Paisley, Manchester, Potteries, and Birmingham schools, and I am sure that an examination of their merits will be sufficient plea for their adoption as what I have suggested, on same terms. Such an astonishing amount of originality should not be thrown away, and manufacturers should be apprised of the existence of these works, and invited to appropriate them to their especial branches of manufacture. I regret to say that the London school, hitherto so successful in this particular class, is sadly deficient this year in both drawing and colouring.

In conclusion, let me remind those who have the selection of form and subject for these designs, that the fountain-head of reformation and purification of ornamental art should pay some slight attention to the bearing of all works produced in the schools of art. If the talent which has been displayed in these productions had been applied *intentionally* to designing for ecclesiastical tiles, or some such purpose, we should have had even a more valuable result than we see at present, and it would have been no greater tax upon the abilities of the students. It does not look like wise economy to risk the wasting of so much artistic labour, when with a little forethought it might so easily have been brought directly to bear upon an important branch of ornamental art. The very excellence of the designs shows what might have been done, if simple rules concerning their colouring as applied to walls or floors had been stated when the form and subject were chosen and given out. The schools of art are supported by the nation for the improvement of ornamental art, and through it for the refinement of the people, and not as a toy, or an amusement which has no end in view. To them we look for emancipation from our gross servility to the French School of Design, and in them alone do we recognize our means of obtaining a school of our own. On them we rely for the proper guidance of our arts and manufactures, and, as a nation, have a right to expect some return for the public money already expended upon them. At the same time let manufacturers remember, that as long as they hold aloof from the schools, they must bear the brunt of the charge of bad taste with which the public is charged. Let them only put themselves in communication with the schools, and offer liberal prices for the designs which they require, and there will be no lack of talent to respond to their requisition. If half the sum they pay a private designer was offered as a prize in a public competition, the manufacturer would receive a much better work, and the student be encouraged to persevere in his profession. A MARLBOROUGH HOUSE STUDENT.

SAXON COINS.—There has been a remarkable find of Saxon coins in the neighbourhood of Scotby. The coins are in an excellent state of preservation, and extend to Edward the Elder, son of Alfred the Great.



The Carlton Club-House: Section of the Front Wall.

THE CARLTON CLUB.

THE Carlton is a purely political club, and was founded by the late Duke of Wellington, and a few of his most influential political friends. It first held its meetings in Charles-street, St. James's, in the year 1831. In the following year it removed to larger premises, Lord Kensington's house, in Carlton-gardens. In 1836, an entirely new house was built for the club, in Pall-mall, by Sir Robert Smirke, small in extent, and plain and inexpensive in its architecture.

As the club grew in numbers and importance, the building soon became inadequate to its wants. In 1846, a very large addition was made to it by Mr. Sydney Smirke; and in 1854, the whole of the original building was taken down and rebuilt by Mr. Smirke, upon a sumptuous scale; and it is now the largest although not the most costly club-house in London. The club consists of 1,300 members, each paying an annual subscription of ten guineas, with an entrance-fee of fifteen guineas. The business of the club is managed by a committee of thirty members and the five trustees, viz.—The Duke of Buccleuch, the Marquis of Salisbury, the Earl of Hardwick, Lord Redesdale, and Lord Verulam.

It is a vulgar error to regard a club as the rich man's public-house: it bears no analogy to a public-house: it is as much the private property of its members as any ordinary dwelling-house is the property of the man who built it.

A history of the clubs of London would make a curious chapter in the social history of the people of England. Our clubs are thoroughly characteristic of us. We are a *proud* people—it is of no use denying it,—and have a horror of indiscriminate association; hence the exclusiveness of our clubs.

We are an *economical* people, and love to obtain the greatest possible amount of luxury at the least possible expense: hence, at our clubs we dine at prime cost, and drink the finest wines at a price which we should have to pay for slow poison at a third-rate inn.

We are a *domestic* people, and hence our clubs afford us all the comforts of home, when we are away from home, or when we have none. Finally, we are a *quarrelsome* people, and the clubs are eminently adapted for the indulgence of that amiable taste. A book is kept constantly open to receive the outpourings of our ill-humour against all persons and things. The smokers quarrel with the non-smokers; the billiard-players wage war against those who don't play; and, in fact, an internecine war is constantly going on upon every conceivable trifle; and when we retire exhausted from the fray, sofas and *chaises longs* are everywhere at hand, whereon to repose *in extenso*, as cats after their nocturnal sports are wont to come home and elongate themselves upon the kitchen hearth. The London clubs are certainly the abodes of earthly bliss, yet the ladies won't think so.

We have already illustrated the entrance front of the new Carlton Club-house (p. 282, and previously), and have given a plan of the ground-floor. The annexed engraving represents the garden front: the pilasters, which here take the place of columns in the entrance front and flank, are of the same material as the latter, namely, Peterhead granite, polished. On the first floor are the east and south library (over the morning-room and writing-room), the card-room (over entrance-hall), and the house dinner-room and billiard-room, over the two ends of the coffee-room; the centre part of the coffee-room has a skylight above it. The vestibule has a gallery round it on this story, marked on the plan of the lower story previously given. We append a section of the front wall in Pall-mall.

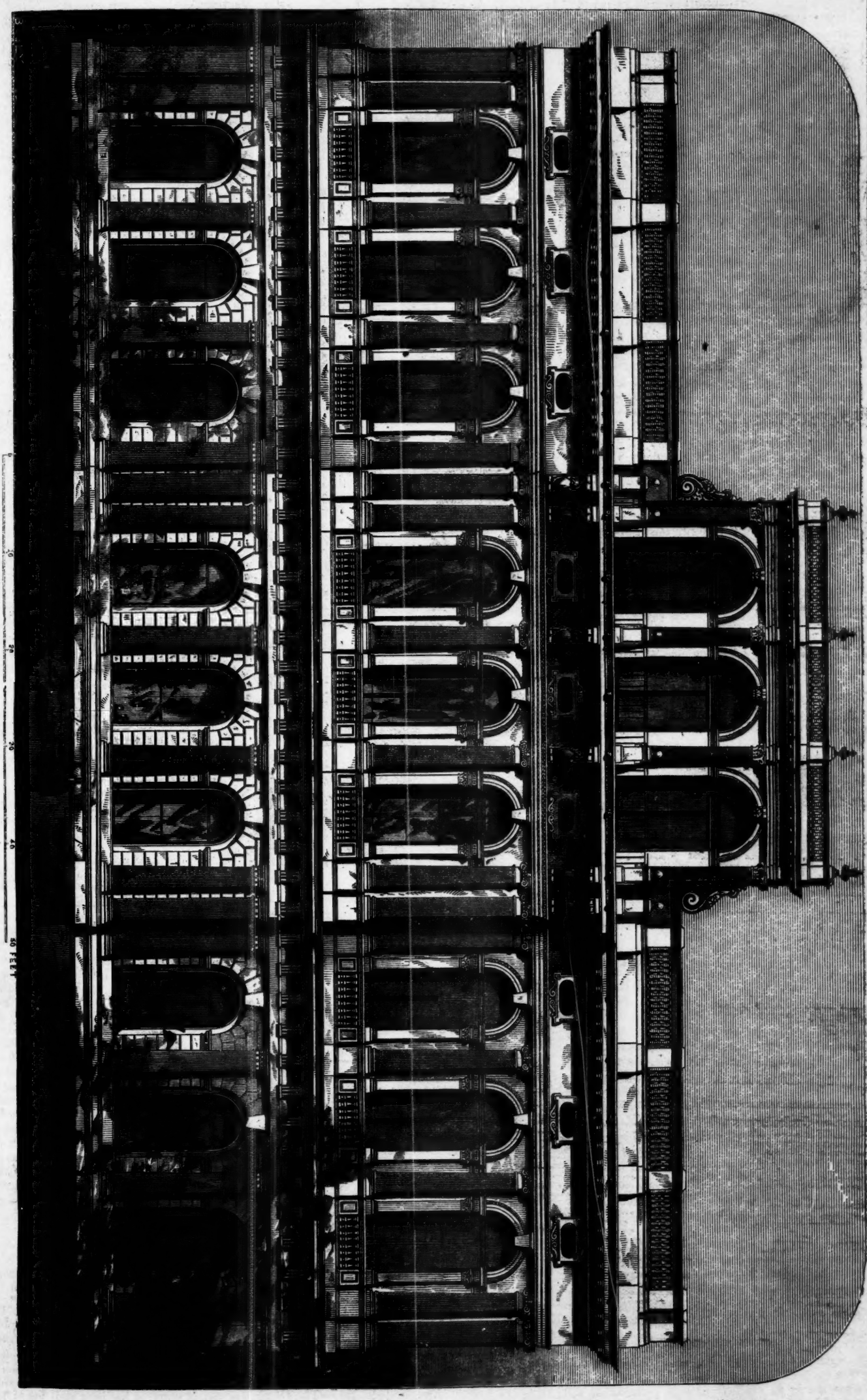
MEETING OF ART-WORKMEN AT ARCHITECTURAL MUSEUM.

THE meeting of art-workmen on Monday evening last, was very well attended: between 300 and 400 persons (chiefly workmen) were present. The Rev. F. D. Maurice was in the chair, and made an address. Mr. S. C. Hall, Mr. Ruskin, the Rev. Charles Boutell, Mr. Penrose, Mr. Scott, and others, also addressed the meeting. Several of the workmen, too, spoke. It seems on the whole to have been a very successful attempt to interest the art-workmen in the Institution, and to show them how they may aid themselves.

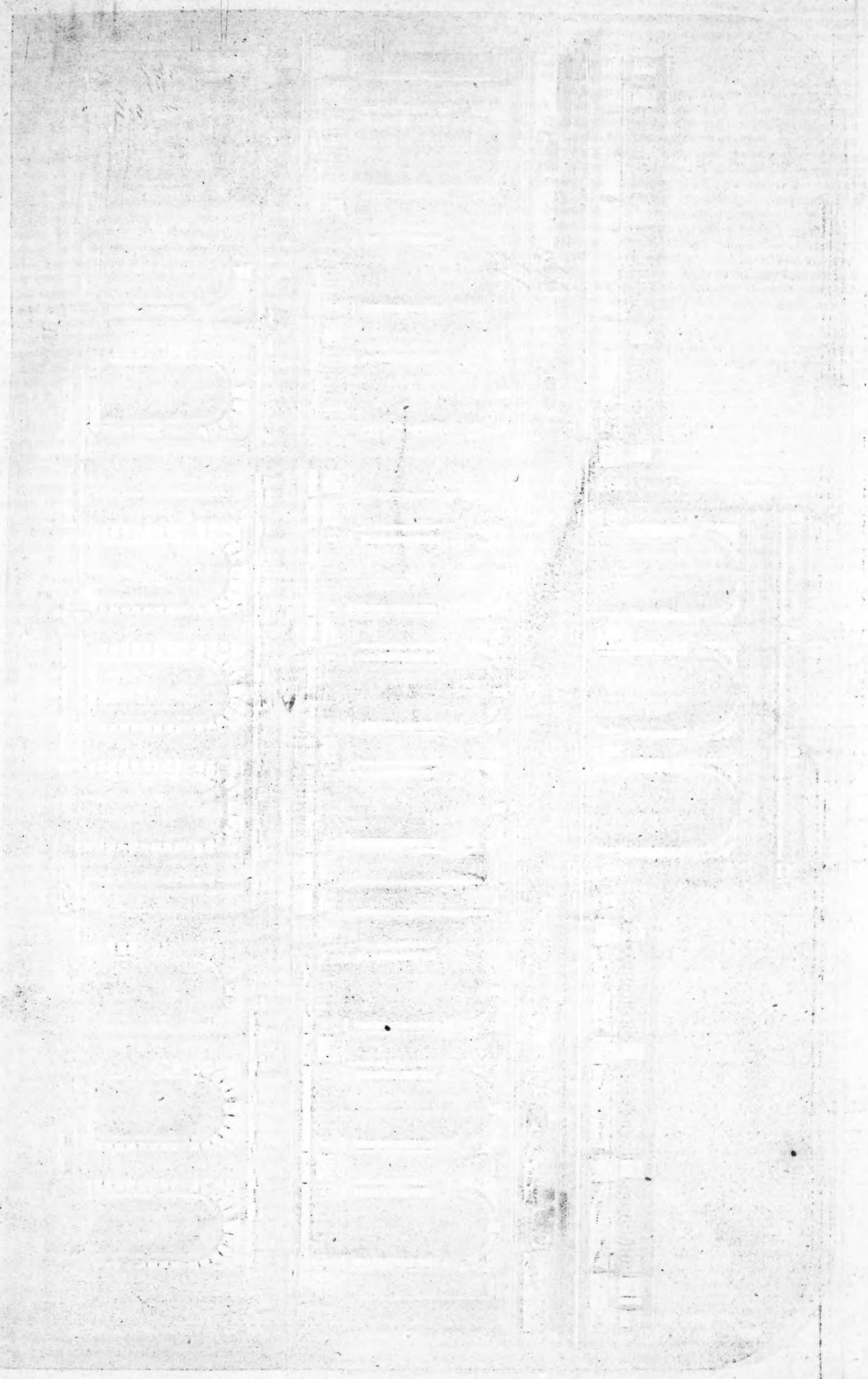
It was announced that Mr. Godwin had offered two prizes of a guinea each, for the second-best specimens of stone and wood carving; and that the Rev. C. Boutell had been raising subscriptions for a prize for a design in metalwork. Mr. S. C. Hall also stated his willingness to place at the disposal of the committee, a sum of money for the same or any other object upon which they might determine.

A correspondent, in reference to our notice of the five-guinea prizes, proposed to be given by the committee of the Architectural Museum, to carvers in wood and stone, objects that they are not large enough for the production of works pretending to reach beyond commonplace mediocrity. It must be remembered, however, that the real prize after all is not the amount offered, but notoriety and distinction.

ELECTRO-TELEGRAPHIC.—The Electric Telegraph Company was lately summoned for poor-rates at Salford, and refused to pay, because it occupied no "land" or "earth." The Court of Exchequer decided against the company, quoting Lord Coke, who said,—"The earth had in law a great extent upwards, not only of water, as had been said, but of ayre, and all other things, even up to heaven."



THE CARLTON CLUB-HOUSE: GARDEN FRONT.—MR. S. SMIRKE, A.R.A. ARCHITECT.



CHURCH-BUILDING NEWS.

Hertford.—At the village of Bengeo, or Benehoo, on a site close to the new National Schools, and adjacent to the principal street of the village, a church, containing sittings for 600 persons (450 free), has been erected, in the Early English style. The church consists of nave and two aisles. The fittings are plain. The seats are lowbacked. The roof is open-timbered. The church is at present without a tower. The total expense incurred is 4,779*l.* 17s. 2d. which is thus divided: erection of church, 3,890*l.*; purchase of land for church and burial ground, 329*l.* 17s. 2d.; fences, gates, stoves, architect, and other expenses, 560*l.* The architect was Mr. Benjamin Ferrey, and the builders were Messrs. Holland and Co. The edifice was consecrated on Friday in last week.

Upper Tooting.—The new church of the Holy Trinity, at Upper Tooting, in the parish of Streatham, was recently consecrated by the bishop of the diocese (Winchester). This church was first promoted some year and a half since, and the subscriptions were rapidly raised, amounting to upwards of 4,000*l.* The ground was then given by Mr. Browse, one of the committee; and some twelve months since the church was commenced, under the superintendence of Mr. A. Salvin, the architect. The edifice, which is calculated to hold 700 persons seated, one-third of the seats being free, is in the Early English style, and built of Kentish rag-stone, with Bath stone dressings, and consists of a nave, with side aisles, together with a chancel, with side aisles also, with columns intersecting. The roof is a plain open timber one, of stained deal, and the pews throughout are of same material. There are no galleries in the church. The tower is not yet commenced.

Norbiton. — The consecration of the new burial ground at Norbiton, Kingston, took place on 27th ult.

Coln St. Aldwyn.—The tomb of the late Sir M. H. Hicks Beach, bart. of Williamstrip Park, Member of Parliament for East Gloucestershire, has just been erected over his grave, in the churchyard of Coln St. Aldwyn. The intersection of the gables forms a floriated cross. In the panels on the north-west and south sides are carved lilies and passion flowers. At the east end are the arms of the family emblazoned on a shield, lying at the foot of the cross. A text of Scripture is inscribed on each side of the plinth. The work has been executed in Ancaster stone, by Mr. S. Cundy, of Pimlico, from a design by Mr. G. R. Clarke, architect.

Shipston-on-Stour.—On 20th ult. the parish church of Shipston-on-Stour, having been rebuilt with the exception of the tower, was re-opened. It consists of a nave, filled with open benches; north and south aisles extended beyond the chancel arch; a chancel, fitted with stalls; north and south porch; and vestry. The architect was Mr. G. E. Street, who had very limited funds at his disposal. He has retained two windows of the original church, one of which, a window of the thirteenth century, together with another of same period, preserved and restored in the old tower, forms the ground-work of his design. The works have been executed by Mr. Joseph Mills, of Stratford-on-Avon, builder. The edifice will accommodate 800 persons.

Bath.—A meeting of the congregation of the Percy Chapel was held last week, when it was stated that the cost of the edifice, including organ, expense of opening, &c. amounted to 4,949*l.* Of this sum 2,550*l.* had been received; 150*l.* promised; and 2,000*l.* borrowed; leaving a deficiency of 250*l.* Messrs. Goodridge, the architects, sent in their account for upwards of 250*l.* accompanied with a stamped receipt for the amount due, the architects having thus given their services gratuitously. A plan was determined on for paying off the debt.

Cardiff.—The opening of the new Congregational Chapel, Cardiff, took place on Thursday before last. This chapel has been lately erected in Charles-street, in this town, for the congregation formerly in Church-street. Mr. R. G. Thomas, of Newport, was the architect, and the builders were Messrs. Price and James, of this town. The chapel is in the Early Decorated style. The face-work of the walls is of various coloured stones, placed so as to contrast with each other. The stones, it is said, "were brought from all parts of the world, and are of every variety of geological epoch." In the construction of the roof, each rafter forms a complete principal, strengthened at intervals of 12 feet by curved ribs, to which are fastened wall-plates, instead of the usual form of beams and purlins. The organ-gallery is placed within an arch at the back of the pulpit. The large west window contains the flamboyant tracery of the Decorated period, and is filled with stained glass. The total cost of the structure amounts to about 2,400*l.* It contains about 530 sittings, and there is a school-room underneath, measuring 73 feet in length by 38 feet in width.

Llowes.—On Tuesday in week before last, the new church of St. Meilig, Llowes, Radnorshire, was opened by the Bishop of St. David's. The church (the erection of which is mainly due to Mrs. De Winton, of Maesllwch Castle) is built on the site of the old one, and, with the exception of part of the tower, is entirely new. It is executed in the grey stone of the country, with Bath stone dressings, and is in the Early English style of architecture, and consists of nave, chancel, and porch entrance, with vestry on the north side. An open arch into the tower displays a three-light tracery window. The chancel windows, four in number, are all of stained glass, by Ward. The east window consists of four lights, representing the Four Evangelists; and a medallion above contains "the Institution of the Holy Eucharist." The south window represents "Christ blessing Little Children," and "Christ stilling the Tempest,"—a family thank-offering for the safe return of Capt. Collinson from the Arctic Seas. The north window represents the "Adoration of the Magi," and a small gable window the "Holy Ghost descending like a Dove." The roof of the nave is of high pitch, stained dark oak: that of the chancel is plastered between the timbers, and coloured ultramarine blue, powdered with gilt stars, and has a cornice of trefoils in light oak: the pavement is of red and black tiles. The building will hold nearly 300 people, and costs about 1,200*l.*

Willaston.—On Thursday in week before last, Christ Church, Willaston, was consecrated by the Bishop of Chester. Willaston is a township in the parish of Neston. The site was given by Mr. P. Heywood; the stone by Mr. Roberts, of Liverpool. The whole cost of the church is 1,300*l.*

Retford.—East Retford parish church, we understand, will be opened on 20th August for divine service, Mr. Lee, the contractor, having nearly completed the restoration of the edifice.

Hulme.—The new church, dedicated to St. Paul, situated in Stretford-road, Hulme, has been opened for Divine service. It is in the Decorated style. The front abuts upon Stretford-road, its entrance consisting of a large porch under the tower. Over the porch is a large six-light window, with traceried head. A similar four-light window lights the front of the aisles. The whole is surmounted by a bell tower, with eight pinnacles. The tower is 71 feet high, and has a window in each of its four sides. The building is 95 feet long and 48 feet wide. There is no fenestration in the sides, the whole of the light for the interior being from the clerestory and the front windows. The clerestory is glazed continuously along both sides. From three metal columns on either side the nave rise skeleton timber arches, and these support the clerestory. There are side and front galleries, and the church will accommodate 1,100 adults and 200 children. The cost of building is 2,200*l.*; and as the edifice will seat 1,100 persons, the average is 2*l.* per sitting! The church was erected from designs by Mr. R. M. Smith, architect; the contractors being Messrs. Mellor, Son, and Terras, Ardwick. A circular stained window, over the altar, bearing an emblem of the Trinity, was furnished by Messrs. Drury and Smith, of Sheffield.

Newcastle-upon-Tyne.—The Bishop of Durham (says the *Gateshead Observer*) having objected to consecrate the Church of England chapel in St. Andrew's Cemetery, unless it were 100 feet apart from the unconsecrated chapel (three times the distance which separates the chapels of the Jesmond Cemetery), there was a meeting on 29th ult. of all the Burial Boards of Newcastle, when a deputation was appointed to wait upon his lordship with the plans of all the cemeteries, and effect a friendly arrangement.

PROVINCIAL NEWS.

Reigate.—The Asylum for Idiots at Reigate was formally opened on Tuesday in last week by Prince Albert. It will accommodate 400 inmates, viz.—34 adult females, 66 adult males, 133 boys, 67 girls, and 100 infants, besides the officers of the establishment. The building is in the Elizabethan style, and is healthfully situated. It consists of a central building, with two wings each of which presents a front miniature of the main front. It has been erected by Mr. Jay, at a cost of about 35,000*l.* The architect was Mr. Moffatt. Mr. Sneezum, of Red-hill, acted as clerk of the works. The visitors at the opening inspected, with much interest and no little astonishment, the drawings, the specimens of tailoring and shoemaking, and the other articles executed by the idiots. A model of a frigate, built by a boy who, at the time he entered the institution, was not possessed of the least glimmer of intelligence, it is said would not disgrace the best shipbuilder in Woolwich Dockyard.

Shoreham. — The foundation-stone of the College of S. Mary and S. Nicholas, at Lancing, was laid on Wednesday week in the presence of several hundred spectators, by Sir John Patteson, the senior trustee. The town was decorated with triumphal arches, bearing inscriptions in Latin and English, and the entrance to the New Shoreham churchyard, nearest the station, was covered with evergreens. The new building will consist of all the usual arrangements of a mediæval *collegium*, in the Middle Pointed style of architecture. The foundations are already finished. The late Mr. Carpenter was the architect who furnished the plans, which are being carried out by Mr. Slater. Messrs. Cheesman, of Brighton, are the builders. The brass plate covering a coin of the realm beneath the stone, bore the following inscription:—

+
Ad SS. et Individuæ Trinitatis
per omnia sæcula sæculorum
gloriam sempiternam
et in honorem Beat. Virg. Mariæ necnon S.
Nicolai
hujusce Collegii
lapidem angularem posuit
vir honoratissimus Ioannes Patteson Eques
reg. mag. a secretior consil
visitatore præposito ac sociis assistentibus
die iv. mensis Iulii. a.s. Mdcccl v
Regnante Victoria
Ashurst Turner, ep. Cicestr. necnon visitatore
Nathaniel Woodard præposito
Ricardo Cromwell Carpenter
qui jam in Christo obdormivit
Architecto primario
Gulielmo Slater operibus præsidente.

The ground plan of the building shows that it will consist of two quadrangles running east and west. In front will be a quadrangular piece of ground, at the south-east corner of which the provost's house is to be erected, and on the northern side will stand the chapel, which will abut from the front of the building. To the south of the chapel, and forming part of the front, will stand the hall, a large building, which will extend to the main entrance, on the other side of which will be the master's house, and this will terminate the front and form the south-east angle of the college. The main entrance, which will be ascended by a flight of broad steps, leads into the first quadrangle; it will be surrounded by class-rooms and other apartments devoted to the officials of the college. On the west side there will be a laboratory and school-room, between which will be a communication with the inner quadrangle: on the other three sides of which dormitories, lavatories, and trunk rooms are to be erected. The college will be erected of flint, with facings of Caen stone. The object of the building is for giving a first-class public-school education, combined with the inculcation of Church doctrines, to children of parents of limited means. The college is to be conducted by clergymen only, and it is children of shopkeepers, and

even of the artizans of populous places like Southwark and Lambeth, who are expected to derive advantages from its operations, as the terms are, it is said, to be on a remarkably low scale. Mr. Woodard, the Provost elect apparently, in his address said, that after the society had erected a chain of schools across the south, they meant to do the same across the north of England, and so cut the manufacturing districts in half. Baron Alderson, Lords Delaware and R. Cecil, and other gentlemen, also addressed the assemblage at the site.

Stafford.—The mural monument subscribed for by the members of the Oxford Circuit, and sculptured by Lough, to the memory of the late Justice Talfourd, has been placed in the Crown-court, Stafford, against the wall between the two galleries. The bust is life-size, but many are of opinion that the likeness is not a good one, and that much of the effect is marred by some few misplaced ornaments.

Melton Mowbray.—The Corn-exchange here appears to be receiving its more decorative touches. Mr. Whitchurch has presented some of Messrs. Minton's centre tiles for the floor of the entrance-hall. There are three of these centre pieces, each of the same design, but the surrounding portions have two patterns. The chimney-pieces are now being sculptured by Mr. Robinson, of Derby, who has completed one with an agricultural group.

Leeds.—The Market Committee of the Leeds Corporation have received tenders for the various works required in the construction of the covered market, to be erected in the Kirk-gate Market-place. There were eight tenders for the whole of the work, and a considerable number for separate divisions of it. The highest estimate for the whole was 14,797*l.* and the lowest 10,854*l.* The latter was from Messrs. Nelson and Son, ironfounders, Leeds, and was accepted. The works are to be proceeded with as early as possible, and will probably, according to the local *Intelligencer*, be completed by the 1st of June, 1856.

Sunderland.—Mr. E. Backhouse, Jun. says the *Gateshead Observer*, has laid before the Building Hill Committee at Sunderland a design for a crystal palace, to be erected on the site of the old house on the highest elevation of the hill, and which, it is estimated, will cost 7,500*l.* The building is to embrace a museum, winter garden, school of design, and large hall for tea meetings, bazaars, and exhibition. It is proposed to offer 20*l.* for the best plan in detail, and estimates for the proposed building. The grounds are in a very forward state. Chairs for the public are liberally scattered over the ground.

Jarrow.—The dock contractors are laying down rails from the old Brandling Junction Railway to the Slake. They are also excavating for the line of railway from below Brockley Whins to Jarrow, and materials for the further progress of the works are being accumulated. The undertaking will be prosecuted with vigour, and in a short time a large body of workmen will be employed in the construction of the docks.

SALTPETRE ON THE SURFACE OF WALLS.

IN connection with the inquiry and remarks on this subject recently made in our journal, it may be useful to refer to a communication from Mr. C. H. Smith, to the "Commissioners on the Fine Arts," which was printed in their second Report, 1843, but was not otherwise made public. Mr. Smith says, in the course of it,—The mineral substances chiefly used in building, consist of lime, sand, and different kinds of stone, neither of which contain any saline or deliquescent matter as an integral part of their composition. No trace of salt or alkali is mentioned in the analyses of various stones that were examined with reference to the selection for building the New Houses of Parliament. Bricks are made of clay, which consists principally of alumina and silica, but generally containing some portion of lime, in the state of carbonate or sulphate; carbonate of magnesia; iron in the state of oxide, or combined with sulphur; and common culinary salt: these various materials, when exposed to a red heat, act chemically on each other: the magnesia most probably will combine with the sulphuric acid, which it obtains partly from the iron pyrites mixed with the clay, and partly from the fuel, if coal is used. It is this sulphate of magnesia (common Epsom salt) which is occasionally found to cover the surface of newly-built walls with an efflorescence like hoar frost.

The presence of saline or deliquescent matter on the surface of a building, either internally or externally, may, to a certain extent, be attributed to carelessness, ignorance, or inattention of those who superintend the construction of an edifice. Salts, alkalies, or acids, according to the usual acceptation of such terms, do not necessarily form any part whatever of building materials. Nearly all animal and vegetable substances, when in a state of putrefaction or decay, produce a certain quantity of saline or alkaline matter, which absorbs moisture rapidly; therefore every precaution should be taken to avoid admitting such substances into a building where damp walls are likely to be of serious importance.

Under ordinary circumstances it is scarcely possible to get rid of the various saline or deliquescent substances that have once been admitted into the walls of a building. The fixed alkalies (potash and soda) may probably be considered imperishable: no length of time can injure them: they may effloresce, or, more properly, they may crystallize on the surface of a wall, and totally or partially disappear again and again, as often as a change in temperature or of dryness or humidity takes place: these changes may be daily, or the salts may remain inactive during ages, and, from some favourable cause, a crop of crystals may be produced as flourishingly as if the wall had been recently erected. The only way to abate the evil, is to brush off the crystals, dry, whenever they appear in the most flourishing condition. If potash has been introduced into the walls, either from the putrefaction of animal or vegetable substances, such as have been named, or from other sources, however thick the wall may be, it will make its way to the surface, and then absorbing nitrogen from the atmosphere, which contains 70 or 80 per cent. of it, nitrate of potash (or saltpetre) is produced.

If we may imagine the possibility of salts in a crystalline state getting to the interior of a dry wall, beyond the influence either of moisture or considerable variation of temperature, in such case they would unquestionably remain crystallized as they were deposited; but such a state of things is never likely to take place: salts are generally communicated to a building in weak solutions: the water very gradually evaporates, carrying with it, from the interior of the wall, the molecules which compose salt. The solution having arrived at the surface, so as to be freely in contact with the atmosphere (which is always essential to crystallization), evaporation continues until the solution is sufficiently strong to crystallize, leaving only the mother-water in the wall, which is indicated by a certain dampness.

Lime, mortar, or some other sort of calcareous earth, seems to act as a vivifying principle to set the molecules of salt and water in action: if no lime were present, crystallization would certainly be much less active. An increase of temperature, or a humid atmosphere, will slowly dissolve the salts: if both these causes occur at the same time, liquefaction will be rapid, and the newly-formed fluid will be absorbed into the wall as fast as the salts are dissolved. These changes will take place with every variation of atmosphere: a cool dry air, in a state of absolute rest or stagnation, is favourable to crystallization: a warm one, charged with aqueous vapour, will facilitate solution. It is extremely probable that several kinds of salts may be formed on the same wall, with their crystals intermixed so as to escape the discrimination of a casual observer, and that each will crystallize and liquefy at different times, according to the temperature and the quantity of moisture in the atmosphere: should this be the case, perhaps the wall may never appear perfectly free from efflorescence, so long as the various stimulants of air, moisture, light, heat, and other causes of attraction are in activity; and, since all attraction is mutual, it may readily be understood, that as the particles of water attract those of the alkaline salt, and retain them in solution, so the particles of alkaline salt will attract those of the water, and hold them in crystallization.

PLAN FOR REALIZING FUNDS FOR METROPOLITAN MAIN SEWERAGE.

THERE has been printed, for the use of the commissioners, an "Inquiry, presented to the Commission by Dr. A. Sayer, Commissioner for Marylebone, "to ascertain the maximum limit of the annual taxation required from the sewers ratepayers, and to advocate for the community the adoption of the principles of joint-stock association for the raising and liquidation of the funds to improve and extend the sewerage, and to intercept from the Thames the sewage and drainage of London." Dr. Sayer having moved at the Court of Sewers on 15th of May last, "That large funds being required efficiently to improve and extend the sewerage and drainage of the metropolis (1,500,000*l.*), and to carry out the great works (resolved on unanimously by the commission as expedient) for the interception and the delivery of the sewage, &c. north of the Thames at Barking-creek, and south of the river at or below Plumstead-marshes (3,500,000*l.*); this Commission do take into consideration the means of raising the money (5,000,000*l.*), paying the interest thereof, and ultimately paying off (5,292,475*l.* which includes the existing debt, 292,475*l.*—the 140,000*l.* now invested in Exchequer Bills, and the 150,000*l.* to be received under engagements entered into by the last Commission—together 290,000*l.* part of the 3,500,000*l.* required for the great works of interception, &c.;) on terms the least onerous and the most equitable for the present and future ratepayers—with reference to the Bill now before Parliament, 'For the better Local Management of the Metropolis;'"—the mover of this resolution proceeds to explain his views, in the course of which he points out that great works carried on at Paris, and in the Department of the Seine, are supported by funds raised under the authority of the legislature, by the public sale of *Obligations de la Ville de Paris*, or *Obligations du Departement de la Seine*;—Bonds of the City of Paris—Bonds of the Department of the Seine; these bonds being for 1,000 francs,—about 40*l.* each; and he states it as his opinion that if Parliament were to grant similar privileges to the metropolis of England, the large funds required might be raised and paid off by the ratepayers with all the advantages and economy of joint-stock association;—that the system would be found preferable to the measures provided by clause 141 of the "Bill for the better Local Management of the Metropolis,"—and that it would secure to the ratepayers the saving of a large amount of money. From this inquiry, he adds, it will become apparent that the maximum limit of a general equal and annual pound-rate need not exceed, from the metropolis, exclusive of the City of London, eightpence,—and from the City of London, fourpence. Such a rate assessed and levied by Act of Parliament on the 1854 gross metropolitan assessment 9,484,945*l.* and on all future increments thereof *without* the present metropolitan rated area,—and on the 1854 gross City of London Sewers Rate assessment rental, 1,241,280*l.* and on all future increments thereof, would, he believes, supply ample means to pay the annual interest of 3,500,000*l.* raised by the issue and sale on the Stock Exchange from time to time as the money may be required, of *Metropolitan and City Sewers Bonds*, to carry out the great works in question. We some years since pointed attention to a similar mode of "realizing great public improvements." Any feasible plan of effecting so great and essential a work as the main sewerage of the metropolis, and the cleansing of its noble river, is worthy of anxious and immediate consideration, for the evil to be remedied is rapidly and intolerably on the increase, and it *must* be abated, and that without further loss of time.

THE LIZARD SERPENTINE.

SOME time since we called attention to the Serpentine Stone obtained from the Lizard district of Cornwall. Although the stone called Serpentine has for many years past attracted occasional notice, it is but recently that commercial enterprise has been energetically directed to the development of the district in which it is principally found. The failure of many, indeed of all, of the attempts formerly made to introduce the material into general use produced, as a natural consequence, a prejudice of which the result has been, that an ornamental stone of very great pretensions has been hitherto condemned either as altogether useless, or adapted only for exceptional application. The brittleness and unsoundness of the stone found on the surface, and the varying results of numerous chemical analyses, induced geologists, as well as practical men, to conclude that these defects and a want of equal consolidation of component parts, were inherent in the material; and it was reserved for

the late Sir Henry de la Beche to suggest that these disadvantages would in all probability be overcome if quarries were opened to some considerable depth, and stone obtained which had not, like that hitherto manufactured, been subject for ages to the influences of air and water.

We are assured that the justice of this opinion has been fully proved, and are informed that the quarries of the Lizard Serpentine Company having, during the last twelve months, been opened by powerful Derrick cranes, to a depth of from 40 to 50 feet, and the superincumbent mass of loose and unsound stone having been thrown over the cliffs, the company have had the satisfaction of coming upon extensive beds of consolidated rock, which are worked in the same manner as quarries of granite. The size of the blocks raised formerly, varied from 2 to 10 feet, but we are told that the masses have increased to so great an extent, that it is now frequently found necessary to break them up before they can be removed.

The stone was supposed to be not only brittle in the extreme, but equally hard with granite; and it was considered that the expense of manufacturing would far exceed that of working the marbles used in this country. Experience has again proved these forebodings to be incorrect. Architects have long been acquainted with the extreme beauty of the material. The Lizard Serpentine is distinguished from that obtained in other parts of the world, by the variety and vividness of its colours, and the intersecting white lines caused by veins of steatite, which were both unsightly and a source of weakness, are not found in the stone obtained from the quarries of the Lizard Company, The serviceable stone runs in beds varying from 4 to 40 feet in width, and the blocks are of the irregular form in which statuary marble is found.

THE ARCHITECTURAL CLASSES—UNIVERSITY COLLEGE, LONDON.

On Saturday, the 30th of June, the following prizes and testimonials were announced and distributed at University College, to the classes in architecture and construction, as awarded by Professor Donaldson. The Right Honourable Lord Monteagle presided.

FINE ART.—*First Year's Course.*

Prize and first certificate—Alfred L. Spencer.

CERTIFICATES OF HONOUR.

Second certificate—Walter Kelsey.
Third certificate—Angelo Bachhoffner.

Second Year's Course.

Prize and first certificate—Henry H. Smith.

CERTIFICATES OF HONOUR.

Second certificate—M. Underwood.
Third certificate—E. A. Gruning.

CONSTRUCTION.—*First Year's Course.*

Prize and first certificate—Joseph Gale.

CERTIFICATES OF HONOUR.

Second certificate—Alfred L. Spencer.
Third certificates—(equal)—Edwin Lawrence, W. F. Hooper, and Angelo Bachhoffner.

Second Year's Course.

Prize and first certificate—M. Underwood.

CERTIFICATES OF HONOUR.

Second certificate—Henry H. Smith.
Third certificate—E. A. Gruning.

MINING SURVEYORS' CHARGES.

BRAY *v.* READ AND LEALE.

In the Court of Exchequer, at Guildhall, on Wednesday, July 4th, before the Lord Chief Baron and a special jury, a rather startling conclusion was arrived at as to the proper amount of remuneration for a mining surveyor's services, the particulars of which I beg to hand you, being, as I confess, unable to determine by what ingenious manner of addition, subtraction, multiplication, or division, the special jury arrived at the particular amount which they awarded to the plaintiff. It appeared, from the statement of counsel, and the evidence brought forward, that Mr. William Bray was, in September, 1853, employed to proceed to the State of Tennessee, U.S. America, on behalf of Mr. Braine, to examine and report upon copper mines in that district, for which service he was to be paid the sum of 400*l.* together with his expenses there and back, and while resident in America. Shortly before starting upon that mission, he was solicited by the defendants, Read and Leale, to examine and report upon another mining property, situate about one mile and a half distant from Mr. Braine's property, and which the defendants were in treaty to purchase. A written agreement was drawn up, signed and handed to plaintiff before his starting,—"a blank" being left for the amount to be charged; and it was verbally agreed by the defendants, with him, that he was to fill up the amount himself. It was proved in evidence that the plaintiff satisfactorily performed the duties undertaken for both parties; that the defendants printed and circulated extracts from his report (without his name appended thereto) in the prospectus of the proposed company, and now set up as a defence, "Not indebted," for that plaintiff was under an engagement to his first employer to report for him only! This defence broke down; and the Judge in charging the jury stated it as his opinion, that although no particular sum was agreed to be paid to plaintiff, yet as it was clear that defendants had availed themselves of his services, he was entitled to remuneration.

Plaintiff called, in support of his claim, Mr. B. P. Wilme, civil engineer and surveyor. Mr. Wilme's maximum pay to a mining surveyor for examining and reporting upon mines, would be ten guineas per day.

Mr. Elijah Galloway, who was also called by plaintiff in support of his demand of 575*l.* for work and labour, stated that he (Galloway) had made underground surveys of mines, and that his charge would be five guineas per day.

For the defence a witness named Wood proved, on oath, that he was on the ground with plaintiff "all the time" he was engaged in making his examination, and the time all put together did not exceed two hours, but was rather under. The special jury found a verdict for the plaintiff, and awarded him 175*l.*!

A LOOKER-ON.

Miscellanea.

ST. JUDE'S CHURCH, MILDMAY-PARK, ISLINGTON.—This church, already mentioned in our pages, has been consecrated. The site, which is near Ball's-pond-road, was presented by Messrs. Sandoz and Brown. The church was designed by Mr. A. D. Gough, and the builders were Messrs. Dove, Brothers, of Islington. The external facings are formed with random Kentish ragstone, relieved with dressings of Bath stone. It is a cruciform church, and has a tower surmounted by a spire of Bath stone, 110 feet high. The latter is enriched with crockets at the angles, and springs from pinnacles which ornament the tower. The interior displays an open timber roof. The entire cost of the church will be about 5,000*l.* Adjoining, and nearly finished, is a parsonage-house, erected also by Messrs. Dove, which accords in style with the Church Schools, to be built as soon as funds can be raised. The whole group will be a considerable ornament to this very improving neighbourhood.

THE IRON TRADE.—No new failures have been announced since our last notice, and it is hoped the worst is over for the present. There is not the least likelihood of any advance in price, however, as yet.

PROFESSIONAL REUNIONS.—Mr. Gutch received a number of his professional friends, chiefly district-surveyors, at dinner a few days ago, including Professor Donaldson, Mr. Kendall, Mr. Henry Baker, Mr. Thomas Little, Mr. Snook, Mr. Foxhall, Mr. Good, Mr. William Donaldson, Mr. Howell, Mr. T. H. Wyatt, Mr. Pownall, and others. Such meetings tend to the extension of that kind feeling which ought to exist among members of the profession. Sir Charles Barry gave a similar dinner a few weeks ago, when, in addition to several named above, Professor Cockerell, Mr. Poynter, Mr. Banks, and others, were amongst the guests.

WOLVERHAMPTON SCHOOL OF PRACTICAL ART.—The first annual meeting of this institution was held on Friday in last week, when there was a large and highly respectable attendance of its friends and members, to receive the first annual report and financial statement of the council, and to appoint office bearers for the ensuring year. The report stated that the attendance and fees during the past year had continued steadily to increase, and the following statement was made of the average attendance of pupils:—

	Pupils.	*Fees.*
First quarter.....	72	£27 7 6
Second ditto.....	106	37 19 9
Third ditto	108	45 9 6
Fourth ditto	120	51 14 0
Total.....		£162 10 9

The annual subscriptions amounted to 134*l.* 8s.; so that the whole income was 296*l.* 18s. 9d. There was a balance, however, against the treasurer of 35*l.* 3s. 10d. many expenses having occurred during the first year which would not appear again. Among the students who have attended the school during the year, were eleven architects and surveyors, three brassfounders, sixteen builders, joiners, and cabinet-makers, two draughtsmen and artists, six engineers and machinists, one locksmith, two moulders and patternmakers, five house-painters, thirteen pupil teachers, five schoolmasters, and thirty-seven youths not apprenticed to any trade. The prizes were distributed after the report was read, and the meeting addressed by the chairman and various other gentlemen.

VALUE OF A SURVEYOR'S SERVICES AT TENBY.—A special meeting of the Local Board of Health, at Tenby, was held on Friday before last, for the purpose of electing a surveyor, who is to give his whole time and attention to the business, for a salary of 25*l.* per annum! Nevertheless, there were no less than five applicants, George Mends, John Smith, G. Stone, J. Lewis, and 'Adolphus Fitz-Sniggins.' The application of Mr. Fitz-Sniggins, however, was a well-deserved satire on the corporation, who constitute the Board. Mr. E. Mends, the collector to the Board, was the successful candidate. 'Fitz-Sniggins's' application merits notice. "By profession," he says, "I am a draper, and from the frequent opportunities I have had of using the yard, think myself fully qualified to undertake any duties requiring a practical knowledge of logarithms, mensuration, and land surveying. With respect to my personal bearing, be under no apprehension. I shall always pay the greatest deference to members of your worshipful body, and my unremitting attention will be directed to *your* happiness, profit, comfort, and convenience. . . . Should *your* drains, &c. become a public nuisance, or *your* wares impede the traffic in the streets,—against *you*, of course, such fortuitous circumstances will not be recorded."

THE "TIMES'" SPECIAL CORRESPONDENT.—Every one has read the brilliant letters of Mr. William Howard Russell, the Special Correspondent of the *Times* in the Crimea; and, without doubt, every one will be pleased to hear that the entire series has been placed in the hands of Messrs. Routledge and Co. for immediate publication. This remarkable Chronicle of the War—from the time of the British Army leaving Southampton to the very latest events—is of important interest in every point of view, no less from having first called the attention of the English nation to the state and management of the army generally, and produced those great and entire changes in its organisation which contributed so greatly to its subsequent successes, than from its enthralling attraction as a powerfully-written, intense, and graphic description of the terrible drama now being played in the Crimea.

SUSSEX FORTIFICATIONS.—Works of considerable importance, besides the numerous martello towers, &c. already in existence, for the defence of the southern coast, are now in progress in Sussex, the expenses of which were set down in the ordnance estimates at 10,000*l.* A new battery is in course of erection at Cuckmere: when completed, it will mount six 24-pounders. At Blatchington and Newhaven new fortifications are also being erected. The latter place is becoming a port of considerable importance, and at the mouth of the harbour extensive works are in course of construction. They are to present an angular front to the sea; and internally there will be brickwork. The batteries will be composed of earthwork, 30 feet thick, rising 9 feet above the level of the eastern pier. The dimensions of the works are 112 feet from each of the angles in the interior. The magazines are of brickwork, and 50 feet square. Each front of the batteries will mount three guns of heavy calibre on swivels. At Littlehampton new fortifications have been just completed and armed.

CHIEF PRIZE, ART-UNION OF LONDON.—For the principal prizeholder in the last distribution, Mr. Sant's picture, "The Fortune Teller," No. 378, Royal Academy, has been purchased, and will be sent to the United States.

CONSUMPTION OF SMOKE.—A digest of the information obtained, with regard to the operation of the inventions for the consumption of smoke, by the General Board of Health, has been laid before Parliament, by command of her Majesty. The following are submitted as conclusions deduced from the evidence obtained:—That the chief impediment to the prevention of smoke in factories is the insufficient boiler surface in proportion to the steam required, a deficiency which occasions waste in two ways—by the escape of heat up the chimney, and by the necessity of over-firing. That many persons have, in spite of all difficulties, succeeded in entirely preventing the escape of visible smoke, and many others reduced the time of its emission. That successful modes of preventing smoke, if there be proper boiler surface, may be adopted without infringing any patent rights, the method in question not having been patented, or the patents having expired. That the reduction of smoke to a minimum amount may be effected with comparative ease, and without the heavy expenses that would be entailed on factory owners by the absolute prohibition of smoke. That the enforcement of anti-smoke regulations would be best effected by the appointment of watch constables. That great facilities would also be afforded by the appointment of qualified officers, not connected with any patentee or boiler manufacturer, to superintend the police employed to suppress the nuisance in smoke, and to advise owners of furnaces how best to observe the law, and to report upon its infringement.

MEMORIAL WINDOW IN ST. PAUL'S EPISCOPAL CHURCH, DUNDEE.—A large stained glass window has been put up in the north aisle of St. Paul's Episcopal Church, Dundee, in memory of Charles Guthrie, esq. of Taybank. The window contains three large subjects from the Life of Christ, representing the Raising of Lazarus, Christ blessing the little Children, and Christ entering into Jerusalem. The whole are enclosed with diapered work on a pearly white ground, with borders. The style of the window is the Decorated. The tracery of the window contains figures of angels, and other ornamental work. The window is the work of Messrs. C. and A. Gibbs, London.

COPPER AND ZINC.—A return obtained by Mr. M. Williams, M.P. shows that the total quantity of copper imported into the United Kingdom in 1854 amounted to 50,940 tons of ore, 6,351 tons of regulus, 1,597 tons of unwrought copper, 1,621 tons of partly-wrought copper, 710 tons of plates and coin, and 688 tons of manufactures. The total quantity of British copper exported in 1854 amounted to 13,678 tons (exclusive of ore). The total quantity of British copper exported from the port of London in 1854 amounted to 5,434 tons, and from Liverpool, 5,920 tons. The quantity of zinc or spelter imported into the kingdom in 1854 was 19,588 tons, and 886 tons of oxide of zinc, while the quantity of British and foreign zinc or spelter exported was respectively 3,080 and 5,322 tons.

SMITHFIELD.—SIR: What is to be done with Smithfield? How many a change of sight and sound has passed upon that ground since the slow retiring wave left it the reedy wildfowl's home; and the ancient Celt viewed its neighbourhood as the natural bulwark of his infant London, or the good Prior Rahere gathered the pious and the poor beneath his hospitable roof. And then how changed when darkness closed upon the last smouldering ember of the holy martyr's fire—when the jeer of the tormentor and the low sob of the bereaved, all were hushed—and the resigned sigh of the dying saint was registered in heaven. A lingering relic of old London times has passed away with St. Bartholomew's fair, and now the heaving, bellowing mass of goaded life has uttered its last groan. What is to be done with Smithfield? A martyrs' memorial is called for, to mark the spot where dying holy men sowed the gospel seed, and watered it with their blood. Let then the glorious spot be marked with a "martyr's cross," and let it be a preaching place as Paul's Cross was of old, where, unrestrained by walls or pews, the Word of Life may be given forth to many a passer by, who only in this way can be reached. All denominations acknowledge the necessity of open air preaching. Forthwith, then, let us have a martyrs' cross and pulpit in Smithfield, from which regularly ordered preaching may proclaim the truths for which our fathers so nobly gave their lives. In our uncertain climate, a partially covered space, like some of our old market crosses, Malmsbury, to wit, might be very appropriate, or a vaulted building carried upon polished shafts of marble or serpentine: a chamber over for vestry, or for a block, might be included.—"NON NOBIS."

ARBOREAL RECORDS OF BUILDINGS.—May I be allowed to offer a few remarks upon some suggestions that have appeared in the *Builder* on this subject. Without wishing to cast a shadow of ridicule on these suggestions, but fully appreciating the motive as to forming, by means of trees, lasting (?) records, or representations, of some of our greatest works, I cannot but feel that we should be deviating from the path of taste were the principles enunciated in those suggestions referred to (as to planting) attempted to be carried out. It is highly desirable that all embellishments in the way of plantations, or planting of any kind, should be founded on the principles of *true taste*, and should be under *no law* but that of nature. I do not see how it is possible to adhere to this principle, in the fashioning out with a mass of trees a model of an architectural structure, so as to afford an approximate outline, or give to the eye the semblance of the object intended. I feel sure that your correspondents cannot desire to see such effects as were produced in the days of "Capability Brown"—the days of straight lines and angles, of plants clipped into such formal and preposterous shapes, or as given in Petruchio's language:—

> "What! up and down carved like an apple-tart;
> Here's snip, and nip, and cut, and slish, and slash,
> Like to a censer in a barber's shop."

So that the beauteous forms of nature were in many gardens almost unknown. One of your correspondents, in speaking of representing a church, proposes to plant oaks for buttresses, elms for pillars, and soon, evidently thinking that trees will grow equally and with as much uniformity as the walls of a building would rise under the hands of the workman,—"Oak has always answered well, as a buttress in the wooden walls of Old England." I do not anticipate it would be so successful as an arboral buttress.—H. M. R.

ART AND THE LORD MAYOR.—Sir Francis Graham Moon and the Lady Mayoress, gave a dinner to the Royal Academy, at the Mansion-house, on Saturday, the 7th instant, and invited the presidents of other bodies of artists and cognate societies, to meet them, together with several known collectors and friends of art. One hundred persons sat down to dinner, including several ladies. The idea was good: it was a very interesting meeting, and a little more cleverness in the selection of toasts would have made it a great success. Sir Charles Eastlake (who spoke very well), Earl Stanhope, the Earl of Perth, Lord Harrowby, Mr. H. T. Hope, Sir R. Murchison, and Mr. Beckett, M.P. were the speakers.

NEW RAILWAY.—The Londonderry, Seaham, and Sunderland Railway, a short line of six miles, connecting Sunderland with Seaham Harbour, and also the Hetton, South Hetton, Seaton, and Londonderry collieries, was opened for passenger traffic on Monday week, when upwards of 1,000 persons passed along it free. The line has been executed at a cost of about 20,000*l*.

ON THE PROBABLE ORIGIN OF MALARIA.—The following remarks are quoted from an article "On the probable Origin of Malaria, and the specific action of Coal-tar, Naphtha, and other Hydrocarbons," by Mr. L. Thompson, in the *Journal of Gaslighting* for June:—"When a common water-bottle, or *carafe*, is filled with ice and water, and suspended in a warm and damp situation, it immediately becomes coated with dew, which collects in it till drops of water fall from the bottle; and if these are allowed to accumulate in a little phial placed to receive them, we have at once a solution of the organic impurities existing in the air of the surrounding locality. Thus, if this had been an inhabited room, a sewer, the ward of an hospital, or the open air, we may expect to learn something by examining this water. Chemically, however, there is nothing to be learnt, at least by any test which I know how to apply; but with the microscope it is very different. . . . The microscopic observer will sometimes notice the formation of a class of confervous plants and infusorial insects in the condensed water, although when first collected nothing can be seen. This result, far from being uniform, is, however, quite exceptional, and will not be found to have any connection with the seeming putrescence of the locality where the water has been collected: the foulest sewer may give no trace of animal or vegetable life, whilst a mass of inodorous mud may give a fluid absolutely alive, as it were, after being kept for only a few hours. It has long been known that the ova of infusorial insects exist in most solid and fluid bodies, but I am not aware that these substances have been detected in the atmosphere; and as, according to my experiments, they prevail only in particular spots of a moist nature, I have suspected that to these animals are due the origin of what has been called malaria, or the presumed generation of certain contagious or epidemic diseases. The object, therefore, will be to examine carefully the water collected in such diseased districts, in hospitals, and from the breath of patients suffering under particular affections; to determine whether the appearances thence obtained indicate varieties of *infusoriæ* and *confervæ*; and, generally speaking, to test the effect produced by mixing small quantities of different re-agents with portions of the water about to be set aside for experiment. I have found that when water of this kind, which alone generated an abundance of vitalised structures, has been mixed with a single drop of creosote water, coal-tar water, camphor water, or water which had been in contact with oil of cloves, no change whatever has occurred in it after many days' exposure to warmth; whereas a small quantity of fluid albumen has rather hastened than retarded the growth of infusorial and confervous products; thus seeming to show that the various forms of volatile hydrocarbons exercise a beneficial action in this respect which does not belong to albumen; and hence it is probable that the large amount of volatile oil continually dissipated during the warmer months of the year from flowers and plants, is a provisional arrangement of the Creator for arresting what may after all prove to be the origin of pestilence. That these oils are not produced merely for human enjoyment is clear from this, that many of them have a disagreeable odour; and the late popular prejudice which attributes to the air of gas-works a specific protective power against cholera, may, perhaps, possess more foundation in reason than is at present supposed."

A NEW SLIDING-RULE has been devised by Mr. Charles Hoare. Its chief advantages are a series of new gauge-points, by which brickwork of any thickness can be converted to standard or cubic measure;—a table of constants, to facilitate the forming of estimates, and the gauge-points for polygons and circles, very clearly tabulated; with concise formulæ for the various operations, which, with the necessary gauge-points, are engraved on the face of the instrument.

LANDLORD AND TENANT.—As it does not appear to be known, that whatever a tenant plants in a garden becomes the property of the landlord, and not even a perennial flower-root can be removed by law, it may be well to mention that a case tried a few days ago in the Clerkenwell County Court has further confirmed this, the tenant having to pay for his own plants: thus a tenant is debarred from cultivating plants, for amusement and instruction, if he is under the necessity of changing his residence, unless he leaves the garden soil unbroken. None but an owner can therefore be expected to expend money on a garden as the law is imperative, and gives all to a rapacious landlord, in spite of custom and usage from time immemorial; and any improvement in form, though evident, is considered as waste.—R. D. C.

BELLS.—The new church of St. Luke's, Marylebone, Mr. Ewan Christian, architect, contains the only peal of bells in the parish. The tenor weighs 8¼ cwt. The bells were cast by the Messrs. Warner, of London, under a new patent process.

ARCHÆOLOGICAL.—The British Archæological Association will hold their congress in the Isle of Wight, from August 20th to 25th inclusive. The Archæological Institute will meet in Shrewsbury during the week commencing August 6th.

LENDING-LIBRARIES IN PUBLIC PARKS.—There can be no harm in any man as often as he takes a stroll to unbend his mind after business, furnishing himself with a book for a companion. There are many moments which individuals give up to such purpose that might be thereby most usefully, and also most profitably employed. The activity of educated minds is wonderful, even in the midst of pleasure. Now there are thousands of persons not insensible to the beauties of our parks and pleasure-grounds, who yet often walk about listlessly and mopingly for want of an intellectual stimulus. I therefore think that our parks might supply a means of agreeable instruction to their frequenters,—a resource to them of reading the newspapers, periodicals, and light literature; and that if the "Woods and Forests" permitted, in one or two spots in the parks, or in one central spot, shops for lending out, at a halfpenny per head for a stated time, the publications of the day, a great benefit would be conferred on the London population. In the hot summer months it is a great pleasure to con over the news in the open air, and places which afford amusement and the cheap luxury of literature at the same time will be doubly appreciated. No one who has visited Paris, and who has often owed a pleasant half-hour to the book-stalls in the Palais Nationale, the garden of the Tuileries, &c. but would give his vote in favour of such circulating libraries in all our English parks.—F. L.

TENDERS

For the covered markets at Leeds. The estimates were for the whole of the works, including brickwork, mason's, and the ironwork:—

Bingley and Co. Leeds	£14,797 0 0
T. Walker, London	14,319 0 0
Bray and Co.	14,200 0 0
Buxton	13,068 0 0
Mabon, Manchester	12,549 5 0
Butler and Co.	12,252 19 0
Cliff	11,081 0 0
Nelson and Sons, Leeds (accepted)	10,854 0 0

For additions and alterations to Hampstead Union. Messrs. W. G. and E. Habershon, architects:—

Cooper	£5,233 0 0
Tolley	4,953 0 0
B. and C. Haynes	4,930 0 0
Rowland and Evans	4,829 0 0
Piper	4,795 0 0
Locke and Nesham	4,795 0 0
Batterbury	4,463 0 0

For the erection of a Sailors' Institute, Mercer's-street, Shadwell. Mr. G. C. Searle, architect:—

Haynes and Eyre	£4,124 0 0
Brown and Co.	4,092 0 0
Hack and Co.	4,044 0 0
Rowland	3,998 0 0
Piper and Son	3,985 0 0
Ashby and Sons	3,868 0 0
Hill	3,802 0 0
Ennor	3,638 0 0
Cooper	3,550 0 0

For new model lodging-houses, Lisson-row. Messrs. W. G. and E. Habershon, architects:—

Hayne	£1,900 0 0
Hopkins and Roberts	1,720 0 0
H. W. Cooper	1,589 0 0
Batterbury	1,549 0 0
Rowland and Evans	1,501 0 0
Tolley	1,497 0 0
J. B. Cooper	1,495 0 0
W. Higgs	1,475 0 0
Reade	1,400 0 0
Wilson	1,250 0 0
Bottomby	1,228 0 0

For building six houses at Bromley, Middlesex, for Mr. Pritchard. Mr. W. Ellison, architect:—

Rivett	£1,795 0 0
Salt	1,750 0 0
Blankburn	1,710 0 0
Hack and Son	1,700 0 0
Jeffrey	1,648 0 0
Watts (accepted)	1,625 0 0